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# TRANSMITTAL FORM

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Total Number of Pages in This Submission 181

Application Number	09/977,664
Filing Date	October 15, 2001
First Named Inventor	Robert D. Herpst
Art Unit	1797
Examiner Name	Lyle Alexander
Attorney Docket Number	

## ENCLOSURES (Check all that apply)

<input type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement  <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Reply to Missing Parts/ Incomplete Application <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation <input type="checkbox"/> Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____ <input type="checkbox"/> Landscape Table on CD	<input type="checkbox"/> After Allowance Communication to TC <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input checked="" type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input type="checkbox"/> Other Enclosure(s) (please identify below):
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## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Roger M. Rathbun		
Signature			
Printed name	Roger M. Rathbun		
Date	April 21, 2008	Reg. No.	24,964

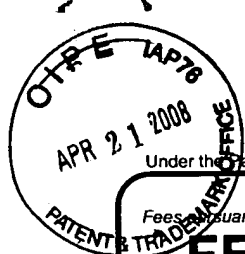
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# FEE TRANSMITTAL

## For FY 2008

☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) \$255.00

### Complete if Known

Application Number	09/977,664
Filing Date	October 15, 2001
First Named Inventor	Robert D. Herpst
Examiner Name	Lyle Alexander
Art Unit	1797
Attorney Docket No.	

### METHOD OF PAYMENT (check all that apply)

☐ Check ☒ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): \_\_\_\_\_

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### FEE CALCULATION

#### 1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	310	155	510	255	210	105	_____
Design	210	105	100	50	130	65	_____
Plant	210	105	310	155	160	80	_____
Reissue	310	155	510	255	620	310	_____
Provisional	210	105	0	0	0	0	_____

#### 2. EXCESS CLAIM FEES

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	210	105
Multiple dependent claims	370	185

Total Claims Extra Claims Fee (\$) Fee Paid (\$)

- 20 or HP = \_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims Extra Claims Fee (\$) Fee Paid (\$)

- 3 or HP = \_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_

HP = highest number of independent claims paid for, if greater than 3.

#### 3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$260 (\$130 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets Extra Sheets Number of each additional 50 or fraction thereof Fee (\$) Fee Paid (\$)

- 100 = \_\_\_\_\_ / 50 = \_\_\_\_\_ (round up to a whole number) x \_\_\_\_\_ = \_\_\_\_\_

#### 4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount)

Other (e.g., late filing surcharge): \_\_\_\_\_

Fees Paid (\$)

#### SUBMITTED BY

Signature		Registration No. (Attorney/Agent) 24,964	Telephone (843) 682-2501
Name (Print/Type)	Roger M. Rathbun		Date 04/21/2008

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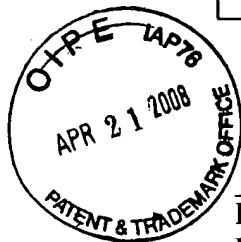
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(PATENT)



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of:  
Robert D. Herpst

Application No.: 09/977,664

Art Unit: 1797

Filed: October 15, 2001

Examiner: Lyle Alexander

For: A SAMPLE HOLDING SUBSTRATE FOR  
USE WITH AN INFRARED  
SPECTROPHOTOMETER OR FILTROMETER  
AND METHODS OF MANUFACTURE AND  
USE THEREOF

MS Appeal Brief - Patents  
Commissioner for Patents  
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**APPEAL BRIEF**

As indicated in the Notice of Appeal filed on February 21; 2008, Appellants hereby appeal the final decision of the Examiner in the above-identified application rejecting the subject matter of the pending claims. For the reasons set forth in this brief, Appellants respectfully request the Board of Patent Appeals and Interferences to reverse the Examiner's final rejection of the claimed subject matter. Appellants are filing this Appeal Brief within the time period for response, and therefore, no fees are believed to be due.

**I. REAL PARTY IN INTEREST**

The real party in interest in the above-identified application is Robert D. Herpst who is the Managing Director of International Crystal Laboratories, the company commercializing the invention covered by the claims of this patent application.

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**II. RELATED APPEALS AND INTERFERENCES**

There are no applications, patents, appeals, interferences or judicial proceedings know to appellant, the appellant's legal representative, or assignee which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

**III. STATUS OF CLAIMS**

Claims 1-2, 10-11, 15-20, 28, 30-31, 33, 35-37 and 39-53 are pending in this application and are set forth in the Claims Appendix (Appendix A). Claims 3-9, 12-14, 21-27, 29, 32, 34, and 38 have been canceled. All of the claims presently rejected in the application are under this appeal.

**IV. STATUS OF THE AMENDMENTS**

A Notice of Appeal was filed February 21, 2008. All prior amendments have been entered.

**V. SUMMARY OF CLAIMED SUBJECT MATTER**Concise explanation of independent claims

Claim 1 is drawn to a sample holder for use with an infrared spectrophotometer or infrared filterometer that analyzes a sample through which infrared light is transmitted (see Figs. 14 and 15, pg. 20, line 22 *et seq*). The sample card holder includes a mounting means comprised of a first material (see Fig. 11, #22, 24) having an aperture (see Fig. 11, #22, 24) formed therein (see Fig. 11, #26, 28). An infrared light transmitting alkali halide crystal sample supporting substrate (see Fig. 11, #20) is present in the aperture and is comprised of a second material allowing infrared light to pass therethrough (see page 16, line 7 *et seq*) without the infrared light transmitting alkali halide crystal sample supporting substrate or any other material within the aperture substantially absorbing infrared light within a substantial portion of the infrared spectral range (see Fig. 11). The infrared light transmitting alkali halide crystal sample supporting substrate is formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling or scaling. (see pg. 15, line 25 *et seq*).

Claim 18 is an independent claim drawn to a method for the manufacture of a sample holder for use in an infrared spectrophotometer or infrared filterometer. The

claim includes the steps of providing a mounting means comprised of a first material (see Fig. 11, #22, 24) having an aperture (see Fig. 11, 26, 28) therethrough. An infrared light transmitting alkali halide crystal material is provided that forms an infrared light transmitting alkali halide crystal sample supporting substrate of a second material having infrared light transmissive properties (see page 16, line 7 *et seq*) such that the substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range. The infrared light transmitting alkali halide crystal sample supporting substrate is formed by cleaving, fly cutting, chipping, milling, or scaling material (see pg. 15, line 25 *et seq*) from said infrared light transmitting alkali halide crystal material to form an infrared light transmitting alkali halide crystal sample supporting substrate that allows the passage of infrared light therethrough. The infrared light transmitting alkali halide crystal sample supporting substrate is positioned within the aperture (see Fig. 11) so as to allow infrared light to pass through the aperture and the infrared light transmitting alkali halide crystal sample supporting substrate and with no other material within the aperture that absorbs infrared light (see Figs. 14 & 15, page 20, line 22 *et seq*).

Claim 30 is an independent claim drawn to a method for using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector (see Figs 14 and 15, pg. 20, line 22 *et seq*). The method comprises the steps of providing an infrared light transmitting alkali halide crystal material (see page 16, line 7 *et seq*). An infrared light transmitting alkali halide crystal sample supporting substrate is provided comprised of a first material having infrared light transmissive properties such that the infrared light transmitting alkali halide crystal substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range (see pg. 16, line 7 *et seq*). The infrared light transmitting alkali halide crystal sample supporting substrate is formed by cleaving, fly cutting, chipping, milling, or scaling the infrared light transmitting alkali halide crystal sample supporting substrate from said infrared light transmitting alkali halide crystal material (see pg. 15, line 25 *et seq*). A mounting means is provided comprised of a second material (see page 16, line 7 *et seq*) having at least one aperture (see Fig. 11, #22, 24) adapted to fit within the spectrophotometer or filterometer. The mounting means is formed so as to be capable of orienting the infrared light transmitting alkali halide crystal sample supporting substrate in the path of the infrared light emitted by an

infrared spectrophotometer or filtometer (see Figs. 14 & 15, page 20, line 22 *et seq*). The infrared light transmitting alkali halide crystal sample supporting substrate is mounted to the mounting means in a position where all or a centrally located part of the infrared light transmitting alkali halide crystal sample supporting substrate is framed by the perimeter of the at least one aperture (see Figs. 14 and 15, pg. 20, line 22 *et seq* and Fig. 11.). A sample to be analyzed is placed onto the infrared light transmitting alkali halide crystal sample supporting substrate and the holder is inserted into the spectrophotometer or filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light through the sample the infrared light transmitting alkali halide crystal sample supporting substrate and the aperture and no other material within said aperture (see Figs. 14 and 15, pg. 20, line 22 *et seq*) other than the sample that absorbs infrared light (see Fig. 11).

Claim 39 is directed to a method for using a sample holder for use in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector (see Figs. 14 and 15, pg. 20, line 22 *et seq*). The method comprises the steps of providing a mounting means comprised of a first material (see Fig. 11 #22, 24) having a plurality of apertures (see Fig. 11, #22, 24) adapted to fit within said infrared spectrophotometer or infrared filtometer (see Fig. 18, pg. 22, line 13 *et seq*). The mounting means is formed so as to be capable of orienting the apertures in the path of the infrared light emitted by an infrared spectrophotometer or filtometer (see page 16, line 7 *et seq*). An infrared light transmitting alkali halide crystal material is provided to form a plurality of infrared light transmitting alkali halide crystal sample supporting substrates comprised of a second material having infrared light transmissive properties such that the substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range (see Fig. 18, pg. 22, line 13 *et seq*). The infrared light transmitting alkali halide crystal sample supporting substrate is formed by cleaving, fly cutting, chipping, milling or scaling said infrared light transmitting crystal sample (see pg. 15, line 25 *et seq*) supporting substrates from said light transmitting material. One of the plurality of infrared light transmitting alkali halide crystal sample supporting substrates is mounted to the mounting means in a position aperture (see Figs. 14 and 15, pg. 20, line 22 *et seq*) wherein all or a centrally located part of one of said infrared light transmitting alkali halide crystal sample supporting substrates is

framed by the perimeter of at least one of the apertures. A sample to be analyzed is placed onto at least one of the infrared light transmitting alkali halide crystal sample supporting substrates (see pg. 19, line 22 *et seq*). The holder having the infrared light transmitting alkali halide crystal sample supporting substrate mounted thereto is inserted into said infrared spectrophotometer or infrared filterometer between the infrared light source and the infrared light detector with at least one of the apertures aligned with the infrared light emitted by the infrared light source to allow the passage of a beam of infrared light through one or more samples, said infrared light transmitting alkali halide crystal sample supporting substrates and apertures and no other material other than the sample within said aperture that absorbs infrared light aperture (see Figs. 14 and 15, pg. 20, line 22 *et seq*).

Claim 45 is drawn to a method of using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector (see Figs. 14 and 15, pg. 20, line 22 *et seq*). The steps of the method comprise providing a plurality of mounting means comprised of a first material (see Fig. 11, #22, 24), each having at least one aperture (see Fig. 11, #26, 28), each of said mounting means being formed so as to be capable of orienting the at least one aperture in the path of the infrared light emitted by an infrared spectrophotometer or filterometer (see Fig. 14 and 15, pg. 20, line 22 *et seq*). An infrared light transmitting alkali halide crystal material is provided forming a plurality of infrared light transmitting alkali halide crystal sample supporting substrates comprised of a second material having infrared light transmissive properties such that the infrared light transmitting substrates do not substantially absorb infrared light within a substantial portion of the infrared spectral range (see Fig. 18, pg. 22, line 13 *et seq*). The infrared light transmitting alkali halide crystal sample supporting substrates is formed by cleaving, fly cutting, chipping, milling, or scaling infrared light transmitting alkali halide crystal sample supporting substrates from said infrared light transmitting crystal material (see pg. 15, line 25 *et seq*). One of said plurality of infrared light transmitting alkali halide crystal sample supporting substrates is mounted to each of said plurality of mounting means in a position wherein all or a centrally located part of said sample supporting mounting means is framed by the perimeter of an aperture (see Figs. 14 and 15, pg. 20, line 22 *et seq*). A mechanical carousel is provided and adapted to fit into the infrared spectrophotometer or infrared filterometer (see Fig. 18, pg. 22, line 13 *et seq*). The

plurality of mounting means is mounted onto the mechanical carousel and a sample to be analyzed is placed onto at least one of the infrared light transmitting alkali halide crystal sample supporting substrates. The carousel is inserted into the infrared spectrophotometer or infrared filterometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light in a sequential manner through the plurality of infrared light transmitting alkali halide crystal sample supporting substrates, said samples and said apertures and no other material other than the samples within said apertures that absorb infrared light (see Fig. 18, pg 22, line 13 *et seq*).

Next, claim 46 is drawn to a method for using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector (see Figs. 14 and 15, pg. 20, line 22 *et seq*). The method comprises the steps of providing an infrared light transmitting alkali halide crystal material and an infrared light transmitting alkali halide crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the infrared light transmitting alkali halide crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range. The infrared light transmitting alkali halide crystal sample supporting substrate is formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting alkali halide crystal sample supporting substrate from said infrared light transmitting alkali halide crystal material (see pg. 15, line 25 *et seq*). A mounting means is provided comprised of a first material (Fig. 11, #22, 24) having at least one aperture (see Fig 11, #26, 28) adapted to fit within the infrared spectrophotometer or infrared filterometer. The holder is formed so as to be capable of orienting the at least one aperture in the path of the infrared light emitted by an infrared spectrophotometer or filterometer (see Figs. 14 and 15, pg. 20, line 22 *et seq*). The infrared light transmitting alkali halide crystal sample supporting substrate is mounted to the mounting means in a position wherein all or a centrally located part of the infrared light transmitting alkali halide crystal sample supporting substrate is framed by the perimeter of the at least one aperture (Fig. 11). The holder is inserted into the infrared spectrophotometer or infrared filterometer to allow the passage of a beam of infrared light through the infrared light transmitting alkali halide crystal sample supporting



substrate to obtain one or more a background scans of the absorbance of the infrared light transmitting alkali halide crystal sample supporting substrate (see Figs. 14 and 15, pg. 20, line 22 *et seq*). A sample to be analyzed is placed onto the infrared light transmitting alkali halide crystal sample supporting substrate (pg. 19, line 27 *et seq*). The holder is inserted into the infrared spectrophotometer or infrared filterometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light through the infrared light transmitting alkali halide crystal sample supporting substrate and the sample located thereon and with no other material within said at least one aperture that absorbs infrared light to obtain a scan of the absorbance of the sample and the infrared light transmitting alkali halide crystal sample supporting substrate (see Figs 14 and 15, pg. 20, line 22 *et seq*). One or more background scans is used to subtract the background absorbance of the infrared light transmitting alkali halide crystal sample supporting substrate without the sample from the absorbance of the sample and the infrared light transmitting alkali halide crystal sample supporting substrate (see pg. 20, line 6 *et seq*).

Claim 47 is drawn to a method for using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector (see Figs 14 and 15, pg. 20, line 22 *et seq*). The method comprises the steps of providing an infrared light transmitting alkali halide crystal material and providing an infrared light transmitting alkali halide crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the infrared light transmitting alkali halide crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range (see Fig. 18, pg. 22, line 13 *et seq*). The infrared light transmitting alkali halide crystal sample supporting substrate is formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting alkali halide crystal sample supporting substrate from said infrared light transmitting alkali halide crystal material (see pg. 15, line 25 *et seq*). A mounting means is provided comprised of a first material having at least one aperture (Fig. 11, #22, 24) adapted to fit within the infrared spectrophotometer or infrared filterometer. The mounting means is formed so as to be capable of orienting the infrared light transmitting alkali halide crystal sample supporting substrate in the path of the infrared light emitted by the infrared spectrophotometer or filterometer (see

Figs. 14 and 15, pg. 20, line 22 *et seq.*) The infrared light transmitting alkali halide crystal sample supporting substrate is mounted to the mounting means in a position wherein all or a centrally located part of the infrared light transmitting alkali halide crystal sample supporting substrate is framed by the perimeter of the at least one aperture. A medium is placed onto the infrared light transmitting alkali halide crystal sample supporting substrate with which a sample will be mixed (see pg. 19, line 27 *et seq.*) The holder is inserted into the infrared spectrophotometer or infrared filterometer to allow the passage of a beam of infrared light through the medium and the infrared light transmitting alkali halide crystal sample supporting substrate to obtain one or more background scans of the infrared light transmitting alkali halide crystal sample supporting substrate and the medium. A sample to be analyzed is mixed with the medium and placed onto the infrared light transmitting alkali halide crystal sample supporting substrate (see pg. 19, line 27 *et seq.*) The holder is inserted onto the infrared spectrophotometer or infrared filterometer analytical instrument between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow infrared light through the infrared light transmitting alkali halide crystal sample supporting substrate and the medium mixed with the sample and with no other material other than the sample within said at least one aperture that absorbs infrared light (see Figs. 14 and 15, pg. 20, line 22 *et seq.*) One or more background scans is used to subtract the absorbances of the medium and the infrared light transmitting alkali halide crystal sample supporting substrate from the absorbances of the medium, the infrared light transmitting alkali halide crystal sample supporting substrate and the sample (see pg. 19, line 6 *et seq.*)

Finally, claim 53 is drawn to a method for using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector (see Figs. 14 and 15, pg. 20, line 22 *et seq.*) The method comprises the steps of providing an infrared light transmitting alkali halide crystal material, providing an infrared light transmitting alkali halide crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the infrared light transmitting alkali halide crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range (see Fig. 18, pg. 22, line 13 *et seq.*), said infrared light transmitting alkali halide crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or

scaling the infrared light transmitting alkali halide crystal sample supporting substrate from said infrared light transmitting alkali halide crystal material (see pg. 15, line 25 *et seq*). A mounting means is provided comprised of a first material having at least one aperture (see Fig. 11, #22, 24) is adapted to fit within the spectrophotometer or filtometer. The mounting means is formed so as to be capable of orienting the infrared light transmitting sample supporting substrate in the path of the infrared light emitted by an infrared spectrophotometer or filtometer. The infrared light transmitting sample supporting substrate is mounted to the mounting means in a position where all or a centrally located part of the infrared light transmitting alkali halide crystal sample supporting substrate is framed by the perimeter of the at least one aperture (see Fig. 11). A bacterial colony to be analyzed is placed onto the infrared light transmitting alkali halide crystal sample supporting substrate (see pg. 20, line 18 *et seq*). The mounting means is inserted into the spectrophotometer or filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light through the bacterial colony, the infrared light transmitting alkali halide crystal sample supporting substrate and the at least one aperture and with no other material other than the bacterial colony within said at least one aperture that absorbs infrared light (see Figs. 14 and 15, pg. 20, line 22 *et seq*).

## **VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

Appellants present the following issue for review:

1. Whether claims 1-2, 10, 11, 15-20, 28, 30, 31, 33, 35-37, 39-44 and 46-53 are properly rejected under 35 U.S.C. 103(a) as being unpatentable over Gagnon et al, U.S. Patent 5,764,355 (hereinafter referred to as "Gagnon") in view of Eden et al, U.S. Patent 4,843,030 (hereinafter referred to as "Eden"), further in view of Applicant's admitted prior art (pages 3-8 of the original specification) or Izumi, U.S. Patent 4,932,78 (hereinafter referred to as "Izumi").

2. Whether claim 45 is properly rejected under 35 U.S.C. 103(a) as being unpatentable over Gagnon et al, U.S. Patent 5,764,355 in view of Eden et al, U.S. Patent 4,843,030, further in view of applicant's admitted prior art (pages 3-8 of the

original specification) or Izumi, U.S. Patent 4,932,780 together further in view of Marker et al, U.S. Patent 4,855,110 (hereinafter referred to as "Marker").

## VII. ARGUMENTS

A. Summary of Examiner's Rejection of Claims 1-2, 10, 11, 15-20, 28, 30, 31, 33, 35-37, 39-44 and 46-53 under 35 U.S.C. 103(a) as being unpatentable over Gagnon, U.S. Patent 5,764,355 in view of Eden, U.S. Patent 4,843,030, further in view of applicant's admitted prior art (pages 3-8 of the original specification or Izumi, U.S. Patent 4,932,780).

In the Final Office Action dated November 23, 2007, there is made the statement that Claims 1-2, 10, 11, 15-20, 28, 30, 31, 33, 35-37, 39-44 and 46-53 are properly rejected under 35 U.S.C. 103(a) as being unpatentable over Gagnon in view of Eden, further in view of applicant's admitted prior art (pages 3-8 of the original specification) or Izumi.

The basis for that rejection is believed set forth in the Office Action dated May 11, 2006 wherein it was stated that "Gagnon et al teach an IR sample holder made of a first material that does not transmit IR radiation having an aperture containing a second material where the sample is applied that transmits IR radiation. Column 5 lines 33+ teach the second IR material may be glass, quartz or polymeric materials."

That Office Action thereafter conceded that "Gagnon et al are silent to the claimed steps of forming the composition."

Turning to the Eden, secondary reference, it was stated in the same Office Action that "Eden et al teach in column 10, lines 26+ that it is known to cleave NaCl crystal to achieve the desired size of crystal. Cleavage had the advantage of insuring separation along precise well determined orientation of the crystal."

It was then concluded that "It would have been within the skill of the art to modify Gagnon et al and use a cleaving method to cut the crystal to gain the above advantages."

The Examiner continued as to Gagnon with "The modified sample holder of Gagnon et al is silent to the specifically claimed glass composition of the glass, specifically the alkali halide such as potassium bromide/chloride and sodium chloride and if the glass is unpolished and cited In re Leshin (125 USPQ 416) the "selection of a material based upon its suitability of intended use would have been within the skill of the art in view of 35 USC 103". It is, therefore the Examiner's contention that applicant's application states that "it is known in the art to place sample for IR analysis in highly polished crystal cuvettes and further that "it is known in the art to use both polished and unpolished crystal blank for IR analysis. The unpolished blanks are taught as costing less to manufacture than the polished."

Finally, as to Izumi, the Examiner has stated that "Izumi teach in column 2 line 24+ polishing KBr crystal is expensive and that a high polishing is needed for wavelengths other than the IR range", and concluded that "It would have been within the skill of the art to further modify the modified device of Gagnon et al in view of Applicant's admitted prior art or Izumi and not polish the crystal to minimize the cost of production."

**A. Appellants' Response**

**None of the references of Gagnon et al, U.S. Patent 5,764,35, Eden et al, U.S. Patent 4,843,030, Applicant's admitted prior art or Izumi, U.S. Patent 4,932,780, in any combination, Disclose or Suggest Applicant's Invention as Set Forth in the Rejected Claims.**

Appellants respectfully disagree with the Examiner's rejection. As an initial note, the present invention, as claimed, has been reviewed and evaluated by various persons having skill in the art to which this invention pertains, and those persons were all of the opinion that the present invention is a patentable invention. The Examiner in the U.K. Patent Office immediately allowed the claims in the corresponding U.K. Patent Application and two renown experts in this field, Dr. De Haseth and Dr. Edward Smolyarenko (see the Statements of De Haseth and Smolyarenko, APPENDIX B). Both were convinced of the novelty and unobviousness of the present claims over any references of record.

Basically, the present invention relates to a disposable or inexpensive sample holder for holding a sample to be analyzed in an infrared spectrometer or infrared filterometer. The principle prior art reference, that of Gagnon, shows a porous screen similar to a window screen on which the sample is placed. The radiation passes through and analyzes the sample trapped in the open area of the screen and not sample material actually placed on the screen material. As such, the transmissibility to infrared radiation of the screen material itself is not a factor in the analysis of the sample with Gagnon. The teaching of that reference is then combined with a reference showing it is known to cleave a crystal material i.e. Eden where the cleaved crystal is used for a semiconductor device and has nothing to do with recognizing the property of a cleaved crystal for its transmissibility to infrared radiation.

It is then an incredible leap to suggest a viable combination of Gagnon and Eden I to substitute a cleaved crystal for the screen of Gagnon where not only is the material different but the analysis system is different, that is, with the present invention, the crystal actually holds the sample and the infrared radiation must pass through the substrate material and thus requires a property of transmissibility of the crystal material, totally unlike the issues of the Gagnon reference where the transmissibility of the substrate is not relevant. Furthermore, the Examiner does not point to any teaching in any prior art which shows that a crystal can be made into a screen and we submit that it cannot.

Applicant submits that the Gagnon reference is simply not a viable principle reference against the present claims. If anything, Gagnon is evidence of a prior art sample holder that illustrates the need, now satisfied by the present invention, for the industry to have an inexpensive, sample holder for a spectrometer or filterometer that can be used and which does not interfere with the IR energy being passed through the samples.

In the Gagnon reference, there is a sample holder that relates to the use of a receiving means that is described as a screen as in U.S. Patent 5,453,252 or a microporous sheet as described in U.S. Patent 5,470,757 (column 2, lines 54-59). As to

the former embodiment where the receiving means is a screen, the materials are suggested to include glass, quartz, metals, alloys as well as polymeric material such as nylons, polyethylenes, polystyrenes, fluoropolymers (e.g. polytetrafluoroethylene), polyamides, polyaramids, polybutadiene etc.

Those listed materials by Gagnon, i.e. glass, quartz or polymeric material are used only in the first embodiment, that is, the screen having a grid pattern similar to window screens. The second embodiment, the microporous sheet, makes no reference to being made of glass or quartz and only appears to be constructed of polymeric materials. The problems with the interference to the relevant wavelengths with the use of polymeric materials has previously been explained and is discussed in detail in the present specification on page 3, beginning at line 16. The deficiencies of polymeric material is further explained in the attached declaration of Dr. James de Haseth submitted herewith, a renown expert in the field of spectroscopy. See paragraph 2c of the attached de Haseth Declaration, referring to polyethylene and polytetrafluoroethylene, "Both substrates obscure important parts of the spectrum and to collect a spectrum without interferences, spectra on both substrates have to be run and then merged together to obtain a good spectrum. This is by no means an easy task". (de Haseth Declaration III)

The Examiner has, in the Office Action dated May 11, 2006, page 3, stated that at column 5, lines 33+ of Gagnon, there is a teaching of "an aperture containing a second material where the sample is applied that transmits infrared energy". Again, as indicated, that portion of the Gagnon specification indicated the second infrared transmitting material to be "glass, quartz or polymeric materials". It is submitted, however, just to the contrary, "glass, quartz and polymeric materials" are not infrared transmitting materials. They all absorb infrared energy and there is no statement in Gagnon that these materials are infrared transmitting materials. In fact, in the attached

statement of Dr. de Haseth, the 3M cards, made under the Gagnon patent, "obscure important parts of the spectrum" Paragraph 1c.

Indeed, in Gagnon, the only reference to an infrared transmitting material is not in respect of the sample substrate, which, as noted above, is a grid, but rather to a "protective cover that is transparent to IR light " (col. 5, line 2). This is certainly not a reference to the sample supporting substrate.

That section of the Gagnon specification cited by the Examiner is preceded by a lengthy description in which it is stated that the sample is received in a grid such as a screen and held in place by surface tension in the aperture. (Gagnon, column 5, line 16 *et seq*). It does not state that the receiving means inside of the aperture transmits infrared energy.

The use of a screen or mesh is discussed in Applicant's specification along with the disadvantages of that type of sample receiver on page 4, beginning at line 9. As there described, the use of microporous sheets or screens are functionally different than crystal optical materials when used in spectroscopy since the microporous sheets absorb the energy from the spectrophotometer and create absorption peaks as shown in Applicant's Figure 1 with respect to polytetrafluoroethylene and Figure 2 with respect to polyethylene. As discussed in Applicant's specification, PTFE has absorbance peaks in the 130 to 450  $\text{cm}^{-1}$  range (page 12, line 17 *et seq*). Polyethylene has strong absorbancies at 2918.7  $\text{cm}^{-1}$  and 2849.9  $\text{cm}^{-1}$  (page 2, line 22 to page 3, line 2). These absorbance peaks are not desirable as they interfere with the analysis of the samples (page 13, lines 12-26). It is also noted in the specification that the crystal optics used in the prior art do not have such absorbance peaks when properly prepared. (page 13, lines 12-26). As also explained in Applicant's specification, particularly with reference to Figures 8, 9 and 10 illustrating the present invention, the cleaved crystal windows perform comparably to the prior art polished crystals (page 15, line 25 *et seq*) and they do not exhibit absorbance peaks of the type shown for the microporous sheets of the prior art sample cards using polyethylene and PTFE (referring again to Applicant's Figures 1 and 2). Note again, the attached de Haseth declaration, where he states, in referring to the absorbance peaks of polyethylene



and polytetrafluoroethylene materials, "Both substances obscure important parts of the spectrum and to collect a spectrum without interferences, spectra on both substrates have to be run and then merged together to obtain a good spectrum. This is by no means an easy task". (de Haset Declaration III).

The presence of that interference is discussed in Truett, U. S. Patent 5,453,252, cited in Gagnon:

"FIG 2 depicts a card 5 containing a porous polyethylene or porous polytetrafluoroethylene window 6 upon which a sample of liquid or solution of a solid or a paste can be placed. The card FIG. 2 is then placed in the cell slide of a FTIR spectrometer and a spectrum determined. The problem with this device is that the spectrum of the porous paper is also determined in addition to that of the sample applied to the card window. This complicates the interpretation of the IR spectrum and renders information in four critical areas of the spectrum uncertain in the case of the polyethylene window and several valuable areas are also useless when the polytetrafluoroethylene paper is used." (Column 1, lines 43-54).(underlining added)

The Gagnon reference specifically refers to Truett as disclosing a screen suitable for the Gagnon sample holder and Applicant's Figure 7 illustrates the Janos device that is produced by use of the disclosure of the Truett patent. That the receiving means of Gagnon must be porous is well described and, indeed, the teaching of Gagnon is to encircle that porous area where the sample is to be placed with a nonporous perimeter, thereby making it clear that the Gagnon sample holder must have a porous receiving means. As further disclosed in Gagnon, the preferred material for the sample receiving means is a microporous polymer sheet. See paragraph 5 of the attached de Haset statement, "While the polymer and screen cards previously discussed are porous and must be porous, a crystal processed in accordance with claim 1 language is not porous". (underlining added) (de Haset Declaration III)

Truett describes the porosity in its only independent claim:

"1. An analytical specimen support for infrared microspectroscopy comprising a pair of opposed generally flat surfaces composed of rigid material that is non-reactive to

water, acidic substances and solvents and having a plurality of unobstructed holes in a screen disposed between said pair of opposed, generally flat surfaces, the cross-sectional area of each hole being sufficient to retain liquid spanning said hole, the liquid being held in said hole by the surface tension of the liquid and said screen being fitted with a substantially flat plate of absorbent material disposed between said screen and one of said pair of opposed flat surfaces.” (Emphasis added)

Applicant's substrate is not a porous screen for receiving and holding the sample to be analyzed nor, of course, is it a polymer. Applicant's substrate is comprised of a crystal produced by very specific steps defined in the claims and the material allows infrared light to pass therethrough without the infrared light transmitting sample supporting substrate or any other material within the aperture substantially absorbing infrared light within a substantial portion of the infrared spectral range. Thus, Applicant's sample holder is dissimilar to the Gagnon holder where the grid or screen is intended to form a base for holding the sample such that the infrared light can pass through the sample located in the voids of the screen and not through the substrate itself.

To the contrary, the substrate of the present invention does not have voids that allow the infrared light to pass through the substrate unimpeded so as to pass only through a sample residing in those voids. The substrate of the present invention is comprised of a crystal that is non-porous thereby requiring the infrared light to pass through the substrate which therefore cannot substantially absorb infrared light since otherwise the eventual analysis would be affected by the absorption of the infrared light by the substrate.

As clearly stated in the Gagnon reference, the screen is not similar to or comparable to the substrate described in the present application as set forth in claim 1 or any of the other independent claims. While various materials are disclosed as usable to make up the screen, it is important to note that the materials are not necessarily selected due to their transparency to infrared radiation. The materials are selected to make up the micromesh and it is the voids that are of importance since the voids hold the material to be analyzed and thus the void volume is suggested to be in the range of

50 to about 98 % so that the thin microporous material does not affect or interfere with the radiation passing therethrough. Thus, the material need not be transparent to the radiation; its effect is minimized by making the mesh very thin (when polyethylene, the thickness is suggested to be less than about 150  $\mu\text{m}$ ) and the void volume great so as to simply minimize the effect of the mesh material on the accuracy of the analysis.

It is believed that the grid pattern screen embodiment of Gagnon is being relied upon by the Examiner and not the polymeric sheet. Again, however, Applicant reiterates the basic difference between the grid type of screen of Gagnon and a crystal of the present invention produced by very specific steps. A "crystal" has previously been defined by Applicant by submitting various well recognized definitions thereof which clearly distinguish the present crystal from a screen having a grid pattern similar to a window screen that simply cannot be produced by cleaving, fly cutting, chipping milling or scaling. Note the definition submitted in the Remarks of the amendment mailed August 11, 2006 as follows: "The Phonics Dictionary states its definition of a crystal as "A solid with a structure that exhibits a basically symmetrical and geometric arrangement". Further, in dictionary.com, the initial definition of a crystal is "A homogenous solid formed by a repeating, three dimensional pattern of atoms, ions or molecules and having a fixed distance between constituent parts". Note also, the attached statement of Dr. de Haseth, paragraph 5: "While the polymer and screen cards previously discussed are porous, and must be porous, a crystal processed in accordance with claim 1 language is not porous." (de Haseth Declaration III) Note also, the attached statement of Dr. Smolyarenko, paragraph 9, "It is well known in the field of crystal growth and optics that a crystal is a solid and that a crystal is not porous." (Smolyarenko Declaration II)

The present issues do not involve the mere selection of a material for an intended purpose. The present invention uses a crystal formed by certain well defined steps while Gagnon suggests the use of a screen similar to a "window screen". The

material employed by Gagnon is not particularly relevant, as with Gagnon, the material to be analyzed is held in the openings or voids formed by the screen and it is not necessary that the IR energy pass through the screen material at all.

The IR energy of Gagnon passes through the material being analyzed that is located in the voids of a screen and not the screen material itself. To the contrary, the substrate of the present invention is comprised of a solid crystal which requires the infrared energy to pass through the substrate material and which, therefore, cannot substantially absorb that infrared energy since it would affect the analysis of the material by absorbing that infrared energy.

The use of a crystal that is formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling is simply not suggested by the presence of a screen that cannot be produced by any of the aforrelisted steps, thus illustrating the differences in the sample holding substrate of the present invention and the screen of Gagnon.

The differences between the use of a screen where the material is spread over the screen and the material to be analyzed is trapped within the voids and the use of a crystal surface where the sample material is spread evenly over the surface is profound. With a screen, if the material is not sufficiently viscous, it will not adhere to the screen material and, therefore, certain materials simply cannot be analyzed with the use of a screen. This is an inherent limitation of a screen used to hold and position the sample material to be analyzed that is not an issue with the use of a crystal material.

There is also a detrimental effect even if the material is sufficiently viscous to be trapped in the screen and cover the voids since the thickness of that sample material will be uneven, that is, due to the effect of surface tension, the material closest to the screen material will be thicker than the material at the center of the void. Thus, with a

screen, the thickness of the sample is not uniform across the void which has an effect on the analysis of that sample material. Note Paragraph [0009] of the present specification where the effect of liquid samples applied to a screen is explained "Furthermore, liquid samples applied to mesh form a meniscus at the interface of the mesh lattice with the liquid which makes the sample thicker in some places than it is in others". Also, Dr. de Haseth noted, in the attached declaration, paragraph 2e, "Sample thickness and coverage are an issue with screens. If the sample has sufficient viscosity or surface tension, the sample will bridge the holes in the screen, but the thickness of the sample will be greater near the supports and thin in the center. If the viscosity is low, the film will break between the supports and voids will be present in the sample."

In addition, with a screen, the IR energy can be reflected off of the screen material; to what extent depends, of course, on the screen material, however, the IR energy can graze off of the screen material and affect the analysis of the sample material. As stated in the declaration of Dr. de Haseth, with a screen, there is a distortion of the spectrum by the sharp derivative bands that "result from grazing incidence radiation reflected off a polymer surface". Further, Dr de Haseth states that "the polymer screens add spectral distortions to the measurement, and all screens reduce the intensity of the radiation". (de Haseth Declaration III)

As such, it is clear that the use of a screen having voids and a crystal where the sample material is spread over the surface of the crystal is totally different. In the former case, the sample material is trapped in voids and is uneven with the screen material not necessarily being a material that is transmissive to IR energy; the latter being a crystal where the sample material can be spread evenly over the crystal surface and where the IR energy must pass through the crystal itself without substantially absorbing of that IR energy.

Taking the secondary reference of Eden, that disclosure relates to the processing of a semiconductor and does not seem to add any useful information to the Gagnon / disclosure to overcome its inherent deficiencies. The Examiner has stated that Eden teaches cleaving of NaCl to achieve the desired size of crystal and he states "cleavage has the advantage of insuring separation along a precise well determined orientation of crystal". However, it is submitted that Eden does not even teach that. Eden states, in its entirety, in reference to this subject:

" the NaCl substrates were prepared by cleaving large crystals in argon" Eden, Col. 10, line 54-55.

That statement is the entire contribution of Eden on the cleaving of NaCl crystals. Thus, Eden does not teach cleaving to achieve transmission of IR radiation nor does it teach anything about the use of a cleaved NaCl crystal as a sample substrate for spectroscopy. Eden does not state that any form of energy, much less light energy, was passed through the cleaved NaCl crystal substrate. In fact, what Eden makes clear is that no form of light energy was passed through the NaCl substrate (which was used for the deposition thereon of a semiconductor film), when it states:

"The excimer laser beam passed over the substrate.....Care was taken to ensure that the excimer laser beam did not irradiate the substrate". Eden, Col 10, 56-62. Underlining added.

Thus, the only light energy mentioned in Eden et al did not even come into contact with the substrate. The Examiner's further comment about the advantage of cleavage insuring separation etc does not seem to be drawn from any teaching in the Eden et al patent.

As to Izumi, it has already been pointed out that the Izumi reference describes the processing of crystals such as KBr as both tedious and expensive (see column 2, lines 29-37 of Izumi). Izumi adds nothing to the already lacking disclosure of Gagnon and, in fact, shows the long felt need in this art for an inexpensive sample card that eliminates the laborous steps of optical polishing a crystal to construct a sample card.

As such, Izumi teaches what was the known state of the art in respect of alkali halide crystals such as NaCl—namely that polishing alkali halide crystals such as KBr (NaCl is also an alkali halide crystal) to the extent that they become useful is an expensive process involving polishing of the crystal, and this perception among experts in the field is the very reason why the instant invention is not obvious and is not anticipated. Note the attached statement of Dr. de Haseth, paragraph 2a “Blanks, which were sold in unpolished form were unsuitable for spectroscopic analysis unless and until they were polished. It was also common for practicing spectroscopists to know how to polish alkali halide windows. This is a time consuming process and it is a skill that has almost been totally lost to the average spectroscopy lab.” (de Haseth Declaration III). Also note the attached statement of Dr. Smolyarenko, paragraph 8 “In the field of optics, and optical materials, it is well known that optics have been precision processed for virtually every application in which they have been used as component of an optical product or optical device, including those optical devices used in spectroscopy for sample analysis”. Dr. Smolyarenko concluded from that background that “Use in a spectroscopic sampling device of an optic formed merely by cleaving, fly cutting, chipping milling or scaling is therefore an unexpected result to those skilled in the art because cleaving, fly cutting, chipping, milling or scaling creates an optic which has not been processed as a blank and has not been precision optically polished yet the optic transmits sufficient light or energy for spectroscopic applications”. (Smolyarenko Declaration I)

Izumi states that for a spectrophotometer in either the infrared or visible range, the beam splitters are 20% to 40% of the entire cost of spectrophotometer (excluding the computer) because the price of processing the optics is so expensive. Izumi Col. 2, lines 53-55.

The Examiner mischaracterizes Izumi as teaching that:

“Izumi teach [sic] in column 2 lines 24+ polishing KBr crystal is expensive and high polishing is needed for wavelengths other than the infrared range”

This distortion of what Izumi teaches implies that high polishing is not needed for the IR range. Izumi teaches no such thing. Izumi states that:

“For the intermediate infrared region, they [beam splitters] are generally made from very expensive KBr single crystal. The surfaces of the substrate and the correcting plate must be optically polished; however, the polishing cost is considerable because a KBr crystal is relatively soft and deliquescent” Izumi, Col 2, lines 31 -37.

There is no statement in Izumi about the cost of polishing KBr or any other crystal for the visible range because neither KBr nor any other crystal is for beam splitters in the visible range. What is used in the visible range is fused silica which is often erroneously referred to as quartz. What Izumi says in respect of the visible range is:

“For the visible range, the substrate and correcting plate can be made from molten quartz; i.e. the material cost is relatively low; however, because of the short wavelength they must be polished higher in flatness than those for the infrared range.” Izumi, Col 2, lines 44 – 48.

To begin with, “molten quartz” is not a crystal. Furthermore, it is quite clear that Izumi teaches that processing KBr for IR applications involves polishing, not just cleaving or cutting etc. As noted above, the implication of the Examiner’s summary of Izumi is distorted and implies that it is somehow cheaper to process KBr for IR applications than for UV applications.

Therefore, the only logical conclusion to be drawn from Izumi is that the known state of the art for processing crystal material such as KBr is that it must be polished and that that polishing is expensive. There is nothing in Gagnon, the prior art referred to in the present specification or Eden to the contrary. The only reference in the present specification to unpolished crystals is to crystal “blanks”, and as to those, they are polished prior to use. See page 5 of the present specification. The spectra shown as Exhibits 5A demonstrate that an unpolished crystal blank has very little transmission as compared to water polished crystal blank, and, as shown in Figs. 8, 9 & 10, cleaved crystals have transmission comparable to water polished crystal blanks. In fact, no one ever used a blank without water polishing it ---they were not used just in blank form.



Both of the statements of Drs. De Haseth and Smolarenko point to the use of blanks that needed to be laboriously polished and opined that the present crystals, made in accordance with claim 1, achieved an unexpected result over the polished blanks. See Dr. de Haseth, paragraph 6, "It is my opinion that it would be unexpected for one skilled in the art of spectroscopy to be able to construct a finished product in the form of a sample holder for an infrared spectrophotometer or infrared filterometer in accordance with the steps and recited features of that claim and that familiarity with the previously discussed prior art relating to sampling substrates made of polymers, screens and crystal blanks (whether polished or unpolished) would not lead one skilled in the art to produce a usable substrate for a sample card in accordance with the recited features of that claim". See also paragraph 8 of the Smolyarenko Declaration II,

"Use in a spectroscopic sample device of an optic formed merely by cleaving fly cutting, chipping, milling or scaling is therefore an unexpected result to those skilled in the art because cleaving, fly cutting, chipping, milling or scaling creates an optic which has not been processed as a blank and has not been precision optically polished yet the optic transmits sufficient light or energy for spectroscopic applications." (Smolyarenko Declar

In the office action dated May 11, 2006, the Examiner cited *In re Leshin* (125 USPQ 416) for the proposition that selection of a material based upon its suitability of intended use would have been within the skill of the art in view of 35 USC 105. It is submitted that such conclusion overstates the holding in *Leshin* as applied to the present facts. The Court in *Leshin* was evaluating a dependent apparatus patent claim relating to a lipstick container wherein it was claimed that the container was made from plastic. The Court noted that "applicant *concedes* the plastics he uses were well known"; and noted further that "mere selection of known plastics to *make a container of a type made by plastics prior to the invention*, the selection of plastics being on the basis of suitability, would be entirely obvious".

Clearly, the claimed invention does not use a crystal material of the type used to make a disposable sample card prior to the invention, and is therefore not the same as the plastic in *Leshin* which was known to make a container in the past. Furthermore, the means of processing the crystal substrates (cleaving, scaling, fly cutting, chipping or

milling) claimed herein are means that had not heretofore been used to make optics that are suitable as spectroscopic sample substrates. Not only has the applicant not conceded obviousness as had the applicant in Leshin, but applicant has also submitted the Statements of two (2) prominent experts who have stated that the use of cleaved, scaled, fly cut, chipped or milled crystals as spectroscopic sampling substrates is not obvious.

Obviousness was uncontested in Leshin and it is contested here by well founded expert opinion. In addition, Applicant submits that the Examiners interpretation and application of In re Leshin would seem to preclude patentability if applied to Gagnon (U.S. 5,764,355 ), wherein known screens of known materials and known micro-porous materials were selected as spectroscopic sample substrates or in Truett (U.S. 5,453,252 & 5,723,341) wherein known screens of known materials were selected as sample substrates. In any event, even if the Examiner's broad reading of In re Leshin were correct, In re Leshin does not extend to applicant's method claims.

#### **THE DECLARATIONS OF DRS. DEHASETH AND SMOLYARENKO**

The Declarations of Dr. de Haseth and Dr. Smolyarenko are attached hereto in APPENDIX B. There are three Declarations by Dr. de Haseth and two by Dr. Smolyarenko.

The de Haseth Declarations were as follows:

1. de Haseth Declaration I – submitted and entered December 2, 2005.
2. de Haseth Declaration II – submitted and entered February 27, 2006.
3. de Haseth Declaration III – submitted and entered March 28, 2007.

The Smolyarenko Declarations were as follows:

1. Smolyarenko Declaration I – submitted and entered December 2, 2005.
2. Smolyarenko Declaration II – submitted and entered March 28, 2007.

The Declarations were submitted both to demonstrate aspects of the issue of commercial success (in the case of de Haseth Declaration III), but more importantly to demonstrate that the present invention is viewed, by two renowned experts in their

fields, based upon the factual foundation and the prior art, as not being obvious to one skilled in the relevant arts. As can be seen, both of these renowned experts reviewed the present application, including the newly amended claims submitted herewith, and based upon the factual and scientific data they presented, are of the opinion that constructing a finished product sample card as defined by the claims would be unexpected to them.

Even though the Examiner stated that the statements of Dr. de Haseth is "held in very high esteem", he nonetheless rejected the statements as "opinion testimony and not convincing to overcome the rejection of record". Applicant has submitted the declarations as representative of one "highly" skilled in the art and it is noted that the Declarations do not state legal conclusions but only voice factually supported opinions as to the inventive level of invention as recognized by experts in the field. The Declarations were made by well qualified experts as to the inventive level of the present invention as measured against the prior art known to these experts as well as the prior art cited by the examiner.

It is appropriate to review the entire history of these experts' Declarations, as it demonstrates how odd the examiner's rejection of these Declarations is. In an interview between the examiner, counsel for the applicant and the applicant on July 25, 2005, the examiner invited the submission of expert statements, particularly to address the nature of prior art "blanks", which are, as mentioned above, alkali halide crystals which were ground but not polished and which had to be polished by the user prior to use as spectroscopic sample holding substrate. This interview was followed by an interview with Examiner, La Toya Cross (Examiner Alexander was ill that day) wherein she reiterated that suggestion. "Examiner recommended that Applicant better define the window as being the light transmitting material (and having no additional panels or substrates on either side of the window) and to better define the light transmitting window as alkali halide crystals."

In the Advisory Action dated December 28, 2005, these expert statements were rejected as not timely. In a note, the examiner stated that the consideration of the affidavits would require more time and, in further note, the Examiner stated that Dr. de Haseth's affidavit appears to rely solely on his opinion.

To address these issues, the applicant filed a Request for Continued Examination (RCE) on February 2, 2006 and submitted a further declaration of Dr. de Haseth (de Haseth Declaration II) which is also attached to this brief as a part of Appendix B. In that Declaration, Dr. de Haseth gave the factual and scientific reasons for the opinion expressed in his Declaration submitted with prior Declaration (de Haseth Declaration I) that "it would be unexpected for one skilled in the art of spectroscopy to be able to construct a finished product in the form of a sample holder for an infrared spectrophotometer or infrared filterometer in accordance with the steps and recited features in that claim [ Claim 1 ]" and his opinion that the independent method claim 18 and independent claims 30, 39, 45, 46, 47 and 53 likewise were unexpected results to him and those skilled in the art. In the De Haseth Declaration II, Dr. de Haseth stated that he had become familiar with sample holding devices in use with infrared spectrophotometers and that none ever employed a sample holding substrate as described in the claimed invention. (de Haseth Declaration II, paragraph 2) and he further stated that:

"In my experience all of the crystal or glass infrared light transmitting windows and sample support substrates used as sample holders in a spectrophotometer have used infrared light transmitting substrates formed by precision optical polishing or vapor deposition." (de Haseth Declaration II, paragraph 3).

This statement by Dr. de Haseth is a statement of fact, not an opinion. Dr. de Haseth went on to state in his Declaration (de Haseth Declaration II) that his opinion (as to unexpected results) in his prior declaration was based on the facts recited above. He further stated (de Haseth Declaration II, paragraphs 5-6), that the claimed invention is

superior to the prior art because of the facts that it is free from material absorbances that interfere with spectroscopic analysis such as those in the prior art 3M cards described in Gagnon and due to its low cost and disposability; and he stated the facts that prior art spectroscopic samples cards except to the aforementioned 3M cards were generally too expensive to be disposable and that 3M cards exhibit strong absorbances that can complicate spectral analysis.

In Dr. Smolyarenko's Declaration (Smolyarenko Declaration I) he stated his opinion that the inventions claimed in Claims 1, 18, 30, 39, 45, 46, 47 and 53 describe and an invention that achieves unexpected results. (Smolyarenko Declaration I, paragraphs 5, 6 and 7). In paragraph 8 of this Declaration, Dr. Smolyarenko set for the factual basis for these opinions as follows:

“ In the field of optics and optical materials, it is well known that optics have been precision polished for virtually every application in [which] they have been used as components of optical products or optical devices, including those optical devices used in spectroscopy for sample analysis. Use in a spectroscopic sampling device of an optic formed merely by cleaving, fly cutting, chipping, milling, sawing or scaling without [being] precision optically polished is therefore an unexpected result to those skilled in the art”.

As was the case with the Declaration of Dr. de Haset, Dr. Smolyarenko's Declaration states the factual basis for his opinion in paragraph 8 of the Smolyarenko Declaration I.

In the Office action dated May 11, 2006, which was responsive to Applicant's amendment mailed February 27, 2006, the Examiner stated that the “Applicants state the 2/27/06 and 12/2/05 Affidavits show commercial success of the instant invention” and the examiner rejected those affidavits because “the affidavits fail to set forth facts”.

As noted above, these Declarations address commercial success only in the case of the de Haseth Declaration, but rather the issue of unexpected results and the Declarations do contain the factual basis for the opinions expressed therein that the claims in instant application are for an invention which is an unexpected result in the minds of those skilled in the relevant arts.

The examiner went on to state, apparently in respect of the Declarations, that “there is no showing that others skilled in the art were working on the problem” and no “evidence that if persons skilled in the art who were presumably working on the problem knew of the teachings of the above cited references, they would still be unable to solve the problem”. (Office Action of 5/11/06, pg. 6). As noted below with respect to the Herpst declaration, it is apparent from the Patent Office records cited as prior art in this case, and in particular the Gagnon and Truet references, that others skilled in the art were working on the problem and these references were cited by Dr. de Haseth who discussed the deficiencies in the solutions embodied in these references.

As for the statement that there is no evidence that if persons who were skilled in the art knew of the references, they would not be able to solve the problem, we can only say that the Patent Office records are made public as a matter of public policy, since disclosure of an invention is the quid pro quo for issuance of a Patent. Accordingly, notice of these references to all skilled in the art must be presumed. If the examiner intended that the applicant must know what is in the minds of others in the field and that the applicant must somehow be able to peer into the R&D programs of competitors to know what they are working on, then he has imposed an impossible burden of proof and mistakes the applicant for Homeland Security. The examiners rejection of the Declarations seems, in our mind, to totally ignore the factual information contained in the Declarations and the issue of unexpected results that these facts address. In any event, in his third Declaration (deHaseth Declaration III, discussed at length below) Dr.

de Haseth addresses all of the prior art cited by the examiner and concludes, after distinguishing all of the prior art, that:

“It is my opinion that it would be unexpected for one skilled in the art of spectroscopy to be able to construct a finished product in the form of a sample holder for an infrared spectrophotometer or infrared filterometer in accordance with the steps and recited features of that claim [Claim 1] and that familiarity with the previously discussed art relating to sampling substrates made from polymers, screens and crystal blanks (whether polished or unpolished) would not lead one skilled in the art to produce a usable substrate for a sample card in accordance with the recited features of that claim.” (de Haseth Declaration III, paragraph 6).

The applicant filed a further amendment on August 14, 2006 in response to the May 11, 2006 Office action referenced above. The applicant went to great length to explain the Declarations of Dr. de Haseth and Dr. Smolyarenko, essentially setting forth the same arguments as are set forth above. On October 26, 2006, the Examiner filed an Office action rejecting the claims and again the Examiner's only comment on all of the declarations filed to support applicant's case was that “The Office has stated the 2/27/06 and 12/2/05 Affidavits are not sufficient to show commercial success of the instant invention as required by MPEP section 716.01” and applicant was urged to follow the guidelines of MPEP to show commercial success. As noted above, the de Haseth and Smolyarenko Declarations (de Haseth Declaration III and Smolyarenko Declaration II) do not address only the issue of commercial success.

The October 26, 2006 Office Action was a final rejection and in response an Amendment after Final Rejection was filed under 37 CFR 1.16 on March 26, 2007 and supplemental Declarations were filed by both Dr. de Haseth and Dr. Smolyarenko. Again, these declarations did not address so much commercial success, which is addressed in the Herpst Declaration, as these renowned experts' well founded opinions that the invention described in the claims is unexpected to those skilled in the relevant

arts based upon the facts of the prior art. These supplemental declarations also addressed the apparent confusion on the part of the Examiner as to what it means to polish an optic and also addressed the history of the development of IR sample cards in the context of the evolution of spectrophotometer technology.

Dr. Smolyarenko's supplemental Declaration (Smolyarenko II), expanded on the factual basis for his opinion when he stated in paragraph 8 thereof:

"In the field of optics and optical materials, it is well known that optics have been precision processed for virtually every application in which they have been used as components of an optical product or optical device, including those optical devices used in spectroscopy for sample analysis. In its crudest form, precision processing comprises grinding an optical material to make the surfaces flat and parallel to form what is known in the industry as a "blank". An optical blank is opaque and cannot be used in an optical device until the opaque surfaces are made transmissive to energy or light by polishing means. The grinding operation to form a blank is normally done on precision optical equipment such as a planetary lapping machine. Precision polishing of an optic comprises grinding the light transmitting surfaces of an optical material with successively smaller particles of grinding or polishing compounds such as Garnet or Aluminum Oxide until the optic becomes sufficiently transmissive to light or energy for the application for which it is intended. Use in a spectroscopic sampling device of an optic formed merely by cleaving, fly cutting, chipping, milling, or scaling is therefore an unexpected result to those skilled in the art because cleaving, fly cutting, chipping, milling or scaling creates an optic which has not been processed as a blank and has not been precision optically polished yet the optic transmits sufficient light or energy for spectroscopic applications."

As was the case with Dr. Smolyarenko's first Declaration (Smolyarenko I), paragraph 8 sets forth the factual basis for his opinion as to unexpected results. The difference between his first and supplemental Declarations is Dr. Smolyarnko's elaboration on what an optical "blank" is and the factual statement that a "blank" cannot be used without further polishing. He further added in paragraph 9 that a crystal is a "solid" as the applicant had argued based on the dictionary definition of the word crystal.



Dr. de Haseth's supplemental Declaration (de Haseth Declaration III) filed with the March 26, 2007 Amendment sets forth in paragraphs 2 (a) through 2 (b) entire factual history of (a) the development of sampling devices and IR sample cards and disposable sample substrates in the context of the technological development of the infrared spectrophotometer and (b) the distinctions between the prior art cited by the examiner and the invention to which the application and this appeal applies:

"a. Prior to the 1980's, it was common to prepare liquid and mull samples as thin films between highly polished alkali halide windows. This was a most satisfactory method when highly polished windows could be obtained at a relatively low price. Unpolished opaque alkali halide window, known as "blanks" were available to spectroscopists at a cost that was considerably lower than the cost of highly polished windows. Blanks, which were sold in unpolished form, were unsuitable for spectroscopic analysis unless and until they were polished. It was also common for practicing spectroscopists to know how to polish alkali halide windows. This is a time consuming process and it is a skill that has been almost totally lost to the average spectroscopy lab.

b. With the dominance of rapid data collection FT-IR spectrophotometers sample preparation became a rate limiting step in spectral measurement. By the 1980's data collection time had become shorter than sample preparation time and spectroscopists, or their lab managers, began to look for ways to reduce preparation and increase efficiency. As unpolished blank alkali halide windows were no longer being polished in the laboratory, the cost of analysis with these windows started to become prohibitively expensive as they had to be purchased from optics vendors in highly polished form at a considerable premium to the price of a "blank". Alternatives to alkali halide windows were sought.

c. Several vendors developed different media for transmission spectrometry of relatively non-volatile liquids, gels and pastes. The first of these devices were cards designed to fit into the sample compartment of a spectrometer, but they used a porous polymer as the sample substrate. I understand the polymer substrates to be described in the 3M patents, which I understand to be U.S. Patent 5,470,757 and U.S. Patent 5,764,355 [Gagnon as discussed supra in this brief]. The two most common substrates are polytetrafluoroethylene (PTFE) and polyethylene (PE). PE has strong absorption bands in the C-H stretching, bending and rocking regions of the spectrum and these bands obfuscate, or at least, distort, the spectrum in those regions. PTFE on the other hand has a series of strong bands in the fingerprint region, that is below 1500cm<sup>-1</sup>. Both substrates obscure important parts of the spectrum and to collect a spectrum without interferences, spectra on both substrates have to be run and then merged together to obtain a good spectrum. This is by no means an easy task.

d. The other common substrate is a mesh, sometimes made of stainless steel or copper, but more likely made of a polymer. I understand the mesh to be described in U.S. Patent 5,453,252 of Truett and which method is referred to as usable to make a

screen in 5,764,355 of Gagnon et al. The mesh resembles mosquito screening. Although metal screens do not absorb IR radiation, they do reduce the intensity of the radiation through the sample compartment. In fact, most commercial vendors of FT-IR spectrophotometers use metal screen to attenuate the beam as these screens do not affect linearity. Polymer screens are not used to attenuate the beam, as the grazing incident radiation over the screen "wires" is absorbed and a spectrum is produced. Most often the spectrum is distorted as sharp derivative bands result from grazing incidence of radiation reflected off a polymer surface. In other words, the polymer screens add spectral distortions to the measurement, and all screens reduce the intensity of radiation.

e. Both screens and polymer substrates have sampling issues. The polymer substrates are rough, or pebbled, to prevent the production of interference fringes. The roughened surface leads to incomplete coverage of the polymer substrate. Typical deposits do not fill the beam and this leads to measurement artifacts. In addition, the deposits are not uniform in thickness, and this also leads to measurement artifacts. Sample thickness and coverage are an issue with screens. If the sample has sufficient viscosity or surface tension the sample will bridge the holes in the screen, but the thickness of the sample will tend to be greater near the supports and thin in the center. If the viscosity is low, the film will tend to break between the supports and voids will be present in the sample. When voids or incomplete sample coverage takes place the photometric equivalent of "stray light" occurs. In an FT-IR spectrometer this has the effect that the transmittance of peaks will reach a limiting value. Conversely, the absorbance will reach a maximum and the peaks will be distorted. Other bands can reach appropriate absorbances so the entire spectrum will be distorted in relative band height. This makes identification and interpretation very difficult. It also reduces the chances of identification by search systems as all modern search systems rely upon relative peak height. Non-uniform sample thickness further exacerbates the distortions beyond what is seen in sample voids or incomplete beam coverage.

f. Cleaved or chipped alkali halide windows do not suffer from these problems. The windows have no absorbances to obscure the spectra, and the surfaces are not so rough to prevent uniform coverage by the sample. In other words, the cleaved or chipped windows return the spectroscopist to the most advantageous situation as was common more than twenty-five years ago. The advantage of the new windows is that they can be prepared inexpensively and rapidly."

The above quoted 883 word factual discussion is further supplemented in paragraph 5 wherein Dr. de Haseth distinguishes the instant invention from the prior art discussed above (which was relied upon by the examiner) as follows:

"While the polymer and screen cards previously discussed are porous, and must be porous, a crystal processed in accordance with claim 1 is not porous."

Based upon this extensive factual background, and bearing in mind the previous Declaration of Dr. de Haseth wherein Dr. de Haseth stated that virtually all optical

devices used for spectroscopic sampling have used polished windows, Dr. de Haseth stated this opinion and these additional facts (the facts are underlined) in paragraph 6:

“6. Use in a spectroscopic sampling device of an optics formed merely by cleaving, fly cutting, chipping, milling or scaling is therefore an unexpected result to those skilled in the art because an optic formed by cleaving, fly cutting, chipping, milling or scaling is not first formed as a blank and is not formed by precision optical polishing, yet the optic transmits sufficient light energy for spectroscopic applications. It is my opinion that it would be unexpected for one skilled in the art of spectroscopy to be able to construct a finished product in the form of a sample holder for an infrared spectrophotometer or infrared filterometer in accordance with the steps and recited features of the claim [Claim 1] and that familiarity with the previously discussed art relating to sampling substrates made from polymers, screens and crystal blanks (whether polished or unpolished) would not lead one skilled in the art to produce a usable substrate for a sample card in accordance with the recited features of that claim.” (de Haseth Declaration III)

As to the supplemental Declarations of Dr. Smolyarenko and Dr. de Haseth, the Examiner stated in the Office Action of June 29, 2007 that:

“The statements made by Dr. Haseth [sic] and are held in very high esteem, However, in the absence of factual evidence, these statements have been considered as opinion testimony and not convincing to overcome the rejections of record.” Pages 4 to 5.

Applicant respectfully disagrees with this statement as each of these Declarations contains extensive factual support for the opinions therein expressed, and Dr. de Haseth's Declaration further explains why the invention is superior in many respects to the prior art (which explains its commercial success).

Applicant filed one further Amendment which limited the claims to an alkali halide sample supporting substrate and reargued the merits of the Declarations of Dr. Smolyarenko and Dr. de Haseth. In the final Office action dated November 23, 2007 from which this appeal arises, the examiner again rejected the Declarations with this statement:

“Applicant references the declaration of Dr. de Haseth. The Office notes the declaration is the opinion of Dr. de Haseth, which is held in high esteem by the Office. However, *In re Lindell*, 385 F.2d 453, 155 USPQ 521 (CCPA 1967) teaches an affiant’s or declarant’s opinion as to the ultimate legal issue is not evidence in the case. In the absence of a factual declaration, Dr. de Haseth’s opinion was not convincing to overcome the prior art.”

The Examiner overstates the holding of *Lindell*, in which the inventor and applicant (the Appellant ) made his own affidavit to the effect that the invention was not obvious to him. What the Court also said was:

“While we do feel that *some* weight ought to be given to a persuasively supported statement of one skilled in the art on what was not obvious to him. In *re Weber*, 341 F.2d 143, 52 CCPA 1015 (1965), here, we think, despite appellant’s contrary assertions, that the legitimate inferences from the art of record are too strong to be affected by the weight to which the affidavit is entitled.”

In this case two (2) independent experts have given factually supported statements which rebut the Examiner’s interpretation of the prior art, and based on those facts they rendered an opinion as to nonobviousness. That is far different from an inventor/applicant making an unsupported declaration that the invention was not obvious to him.

Furthermore, the Examiner never dealt with the Smolyarenko Declaration nor with the facts set forth at length in both declarations (not to mention the earlier declarations) which he completely disregarded without discussion and simply characterized as mere opinion.

**THE DECLARATION OF ROBERT D. HERPST**

The Declaration of Robert D. Herpst (Herpst Declaration) is directed to the issue of commercial success in order to tip the balance in the favor of patentability. Mr. Herpst is the Managing Director of International Crystals Laboratories, the company marketing the sample cards covered by the claims in this application. In his statement, Mr. Herpst has set forth facts relating to the increased sales of the invention covered by the claims in this application. In this instance, the claims are submitted to cover a product so different than that of the prior art or the other sample cards currently on the market that it can be seen that the enhanced sales are conclusively due to the claimed subject matter. Dr. de Haseth's Declaration supplements that of Mr. Herpst, wherein he distinguished the invention from the prior art and pointed out the numerous deficiencies in prior art sample cards (see *supra*, pp 31 to 32). This is not a case where the claims cover a relatively minor feature of an invention such that the sales cannot be said to be directly a result of that minor feature. The claims cover a new product and it is that product that is being sold in the marketplace and which have been rewarded for the novelty with ever increasing market acceptance and sales. Furthermore, Mr. Herpst stated not only that the sales increased and exceeded those of prior art sample substrates such as 3M cards, but also that the success of the invention was due to the attributes of the invention:

"...based upon conversations with customers who use the invention...the commercial success of the invention is attributable to several unique properties of the invention, which include...: (i) the product provides a sample support substrate that does not materially absorb infrared energy, (ii) the product provides a sample support that does not require special storage or handling to protect it from humidity effects, (iii) the product is inexpensive, (vi) the product is disposable and therefore does not require cleaning and (v) the product is self contained and easily mounted in a spectrophotometer." (Herpst Declaration, Paragraph 7).

These statements by Mr. Herpst are supported by those of Dr. de Haseth (de Haseth Declaration III) who stated that the invention has windows which "have no material absorbances" as distinguished from the prior art and the cleaved or chipped surfaces are not so rough as "to prevent uniform sample coverage" as distinguished from the prior art, and that the cleaved or chipped windows can be prepared "inexpensively and rapidly" (de Haseth Declaration III, paragraph 2 (f)).

The Examiner has stated that the statement of Mr. Herpst was insufficient to "overcome the rejection of the claims based on 35 U.S.C. 103" and that there was no showing that others of "ordinary skill in the art were working on the problem, and if so, for how long. In addition, there is no evidence that if persons skilled in the art who were presumably working on the problem knew of the teaching of the above cited references, they would still be unable to solve the problem".

Obviously, it is not possible for Applicant, or any applicant for that matter, to obtain a Statement from a competitor that they were working on the same problem, knew of the same prior art and were unable to solve the problem. Therefore, other evidence must be presented to meet the burden suggested by the Examiner.

In this case, the burden is surely met by the very record in the present patent application, that is, one need look no further than the very prior art cited in the present patent application to clearly see the need in the industry coupled with an effort by "others".

Take, for example, the patents of 3M Corporation, a renowned Fortune 500 company and who obviously recognized and attempted to solve the ongoing problem of the need in the field for a low cost sample card by coming up with polymer based cards in the prior art cited in the present application, see U.S. Patent 5,470,757 and U.S.

Patent 5,764,355 (the "3M Patents"). The deficiencies of the sample cards described in the 3M Patents, however, has been explained by Dr. de Haseth in his attached statement, paragraph 2c, to the effect that the use of polymer cards creates absorbance peaks that interfere with the spectroscopic analysis of the sample itself. "Both substrates obscure important parts of the spectrum and to collect a spectrum without interference, spectra on both substrates have to be run and then merged together to obtain a good spectrum. This is by no means an easy task."

As such, it would seem clear that a major competitor, the 3M Corporation, certainly was familiar with its own prior art, has been attempting to provide the market with a disposable sample card and that its efforts resulted in a commercially sold sample card, exemplified in the aforementioned U.S. Patents, and that effort resulted in a sample card with the deficiencies explained by Dr. De Haseth. Accordingly there is clear evidence of a problem in the prior art that has now been solved by the use of the present sample cards where the crystal does not interfere with the analysis by creating interfering peaks.

Thus, it would seem clear that (1) sales have consistently increased, (2) there was a need in the industry and (3) others (3M) have been trying to solve the problem and fulfill the long felt need and still not come up with a successful solution to the problem. The present invention resolved many deficiencies in the prior art sample substrates which were pointed out by Dr. de Haseth as well as the issue of the deliquescent nature of prior art polished alkali halide crystals as discussed in Izumi.

**A. Summary of Examiner's Rejection of Claim 45 under 35 U.S.C. 103(a) as being unpatentable over Gagnon et al, U.S. Patent 5,764,355 in view of Eden et al, U.S. Patent 4,843,030, further in view of applicant's admitted prior art (pages 3-8 of the original specification or Izumi, U.S. Patent 4,932,780 together further in view of Marker et al, U.S. Patent 4,855,110.**

The position of the Examiner with respect to claim 45 is that claim 45 is rejected basically founded on the arguments previously presented with respect to claims 1-2, 10, 11, 15-20, 28, 30, 31, 33, 35-37, 39-44 and 46-53 but concedes that such references are silent as to the use of a carousel. Thus, the position of the Examiner is that Marker et al teach the use of a carousel in an automated analyzer and that a carousel "has the advantage of providing immediate access to all of the samples, which enables "stat" analysis of an important sample. Automated analyzers have the additional advantages of reducing human error, lower labor costs and permit 24/7 operations.

Thus, the Examiner concluded "It would have been within the skill of the art to modify Gagnon et al (USP 5,764,355) in view of Eden et al, further in view of Applicants' admitted prior art (pages 3-8 of the specification) or Izumi (USP 4,932,780) together further in view of Marker et al and use a carousel engaged with an automated analyzer to gain the above advantages."

**B. Appellants' Response**

**None of the references of Gagnon et al, U.S. Patent 5,764,35, Eden et al, U.S. Patent 4,843,030, Applicant's admitted prior art or Izumi, U.S. Patent 4,932,780 or Marker et al, in any combination, Disclose or Suggest Applicant's Invention as Set Forth in Claim 45.**

Applicant simply reiterates its position with respect to claim 1, and notes that claim 45 merely utilizes an exemplary embodiment wherein the invention is utilized with a carousel type of spectrophotometer



### VIII. CONCLUSION

Appellants submit that claims 1-2, 10-11, 15-20, 28, 30-31, 33, 35-37 and 39-53 are both novel and unobvious over the references cited in the present application and respectfully request that the Board reverse the rejection of claims 1-2, 10-11, 15-20, 28, 30-31, 33, 35-37 and 39-53 for the reasons set forth above.

Dated: 04/21/2008

Respectfully submitted,

  
\_\_\_\_\_  
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## CLAIMS APPENDIX A

1. A sample holder for use with an infrared spectrophotometer or infrared filterometer that analyzes a sample through which infrared light is transmitted comprising a mounting means comprised of a first material having an aperture formed therein, an infrared light transmitting alkali halide crystal sample supporting substrate being present in the aperture comprised of a second material allowing infrared light to pass therethrough without the infrared light transmitting alkali halide crystal sample supporting substrate or any other material within the aperture substantially absorbing infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting alkali halide crystal sample supporting substrate being formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling.

2. The sample holder as defined in claim 1 wherein the infrared light transmitting alkali halide crystal sample supporting substrate is mounted in the holder such that the perimeter of the aperture frames all or a centrally located part of said infrared light transmitting alkali halide crystal sample supporting substrate to form an unimpeded path for infrared light to pass through the infrared light transmitting sample supporting substrate.

10. The sample holder as defined in claim 1 wherein said infrared light transmitting alkali halide crystal sample supporting substrate is an alkali halide crystal.

11. The sample holder as defined in claim 1 wherein said infrared light transmitting alkali halide crystal sample supporting substrate is an alkali halide crystal selected from the group consisting of KBr, NaCl and KCl.

15. The sample holder as defined in claim 2 further having an infrared light transmitting cover slide window formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling.

16. The sample holder as defined in claim 15 wherein a spacer is located between said infrared light transmitting alkali halide crystal sample supporting substrate and said infrared light transmitting cover slide window to create a predetermined space therebetween.

17. The sample holder as defined in claim 15 wherein said infrared light transmitting cover slide window is affixed to said infrared light transmitting-crystal sample supporting substrate by a clamping means.

18. A method for the manufacture of a sample holder for use in an infrared spectrophotometer or infrared filterometer, said method comprising the steps of:

providing a mounting means comprised of a first material having an aperture therethrough;  
providing an infrared light transmitting alkali halide crystal material,  
forming an infrared light transmitting alkali halide crystal sample supporting substrate of a second material having infrared light transmissive properties such that the substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting alkali halide crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling, or scaling material from said infrared light transmitting alkali halide crystal material to form an infrared light transmitting alkali halide crystal sample supporting substrate that allows the passage of infrared light therethrough;

positioning the infrared light transmitting alkali halide crystal sample supporting substrate within the aperture so as to allow infrared light to pass through the aperture and the infrared light transmitting alkali halide crystal sample supporting substrate and with no other material within the aperture that absorbs infrared light.

19. A method for the manufacture of a sample holder as defined in claim 18 wherein said step of providing a mounting means having an aperture comprises providing a disposable card or demountable card.

20. A method for the manufacture of a sample holder as defined in claim 18 further including the step of:

mounting the infrared light transmitting alkali halide crystal sample supporting substrate to the holder in a position wherein all or a centrally located part of the infrared light transmitting alkali halide crystal sample supporting substrate is framed by the perimeter of said aperture.

28. A method for the manufacture of a sample holder as defined in claim 18 further including the step of affixing an infrared light transmitting cover slide window to the infrared light transmitting alkali halide crystal sample supporting substrate to provide a means of sandwiching a sample between said infrared light transmitting cover slide window and said infrared light transmitting alkali halide crystal sample supporting substrate.

30. A method for using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting alkali halide crystal material,

providing an infrared light transmitting alkali halide crystal sample supporting substrate comprised of a first material having infrared light transmissive properties such that the infrared light transmitting alkali halide crystal substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting alkali halide crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling, or scaling the infrared light transmitting alkali halide crystal sample supporting substrate from said infrared light transmitting alkali halide crystal material,

providing a mounting means comprised of a second material having at least one aperture adapted to fit within the spectrophotometer or filtometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting alkali halide crystal sample supporting substrate in the path of the infrared light emitted by an infrared spectrophotometer or filtometer,

mounting the infrared light transmitting alkali halide crystal sample supporting substrate to the mounting means in a position where all or a centrally located part of the infrared light transmitting alkali halide crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a sample to be analyzed onto the infrared light transmitting alkali halide crystal sample supporting substrate,

inserting the holder into the spectrophotometer or filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light through the sample, the infrared light transmitting alkali halide crystal sample supporting substrate and the aperture and no other material within said aperture other than the sample that absorbs infrared light.

31. A method as defined in claim 30 wherein said step of providing a mounting means comprises providing a card made of a disposable material.

33. A method as defined in claim 31 wherein said step of providing an infrared light transmitting material comprises providing a material selected from the group consisting of KBr, NaCl and KCl

35. A method as defined in claim 31 wherein said step of providing a mounting means further comprises the step of affixing an infrared light transmitting cover slide window to the infrared light transmitting alkali halide crystal sample supporting substrate to form a means of sandwiching a sample between said infrared light transmitting cover slide window and said infrared light transmitting alkali halide crystal sample supporting substrate, said infrared light transmitting cover slide window being formed by one or more of the steps comprising cleaving, fly cutting, chipping,

milling, or scaling without precision optical polishing of the infrared light transmitting cover slide window.

36. A method as defined in claim 35 wherein said step of placing a sample to be analyzed comprises sandwiching the sample between the infrared light transmitting cover slide window and the infrared light transmitting alkali halide crystal sample supporting.

37. A method as defined in claim 36 wherein said step placing a sample to be analyzed comprises placing a bacterial colony between said infrared light transmitting cover slide window and said infrared light transmitting alkali halide crystal sample supporting substrate.

39. A method for using a sample holder for use in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing a mounting means comprised of a first material having a plurality of apertures adapted to fit within said infrared spectrophotometer or infrared filterometer, said mounting means being formed so as to be capable of orienting the apertures in the path of the infrared light emitted by an infrared spectrophotometer or filterometer,

providing an infrared light transmitting alkali halide crystal material,

forming a plurality of infrared light transmitting alkali halide crystal sample supporting substrates comprised of a second material having infrared light transmissive properties such that the substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting alkali halide crystal sample supporting substrate being formed by cleaving,

fly cutting, chipping, milling or scaling said infrared light transmitting crystal sample supporting substrates from said light transmitting material,

mounting one of said plurality of said infrared light transmitting alkali halide crystal sample supporting substrates to the mounting means in a position wherein all or a centrally located part of one of said infrared light transmitting alkali halide crystal sample supporting substrates is framed by the perimeter of at least one of the apertures,

placing a sample to be analyzed onto at least one of the infrared light transmitting alkali halide crystal sample supporting substrates,

inserting the holder having the infrared light transmitting alkali halide crystal sample supporting substrate mounted thereto into said infrared spectrophotometer or infrared filterometer between the infrared light source and the infrared light detector with at least one of the apertures aligned with the infrared light emitted by the infrared light source to allow the passage of a beam of infrared light through one or more samples, said infrared light transmitting alkali halide crystal sample supporting substrates and apertures and no other material other than the sample within said aperture that absorbs infrared light.

40. A method for using a sample holder as defined in claim 39 wherein said step of forming a plurality of apertures and infrared light transmitting alkali halide crystal sample supporting substrates mounted thereon comprises forming the plurality of apertures and infrared light transmitting sample supporting substrates in a carousel configuration.

41. A method for using a sample holder as defined in claim 40 wherein said step of placing a sample to be analyzed comprises placing a plurality of samples onto said plurality of infrared light transmitting alkali halide crystal sample supporting substrates and said infrared spectrophotometer or infrared filterometer passes infrared light sequentially through said plurality of samples, said infrared light transmitting alkali halide crystal sample supporting substrates and said apertures and no other material within said apertures that absorbs infrared light.

42. A method for using a sample holder as defined in claim 40 wherein said step of placing a sample onto at least one of the infrared light transmitting alkali halide crystal sample supporting substrates comprises placing a bacterial colony onto said at least one infrared light transmitting sample supporting substrate.

43. A method for using a sample holder as defined in claim 40 wherein said step of inserting the holder having the infrared light transmitting alkali halide crystal sample supporting substrate mounted thereto into the infrared spectrophotometer or infrared filterometer comprises inserting the holder in a horizontal position within the infrared spectrophotometer or infrared filterometer and passing a beam of infrared light at least once through the sample, the infrared light transmitting alkali halide crystal sample supporting substrates and the aperture.

44. A method for using a sample holder as defined in claim 43 wherein the beam of infrared light is passed at least once through the sample by means of reflection.

45. A method for using a sample holder for use in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing a plurality of mounting means comprised of a first material, each having at least one aperture, each of said mounting means being formed so as to be capable of orienting the at least one aperture in the path of the infrared light emitted by an infrared spectrophotometer or filterometer

providing an infrared light transmitting alkali halide crystal material,

forming a plurality of infrared light transmitting alkali halide crystal sample supporting substrates comprised of a second material having infrared light transmissive properties such that the infrared light transmitting substrates do not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting alkali halide crystal sample supporting substrates formed by cleaving, fly cutting, chipping, milling, or scaling infrared light transmitting alkali halide crystal sample supporting substrates from said infrared light transmitting crystal material,



mounting one of said plurality of infrared light transmitting alkali halide crystal sample supporting substrates to each of said plurality of mounting means in a position wherein all or a centrally located part of said sample supporting mounting means is framed by the perimeter of an apertures,  
providing a mechanical carousel adapted to fit into the infrared spectrophotometer or infrared filtometer,  
mounting said plurality of mounting means onto the mechanical carousel,  
placing a sample to be analyzed onto at least one of the infrared light transmitting alkali halide crystal sample supporting substrates,  
inserting the carousel into the infrared spectrophotometer or infrared filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light in a sequential manner through the plurality of infrared light transmitting alkali halide crystal sample supporting substrates, said samples and said apertures and no other material other than the samples within said apertures that absorb infrared light.

46. A method for using a sample holder in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting alkali halide crystal material,  
providing an infrared light transmitting alkali halide crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the infrared light transmitting alkali halide crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting alkali halide crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting alkali halide crystal sample supporting substrate from said infrared light transmitting alkali halide crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the infrared spectrophotometer or infrared filtometer, said

holder being formed so as to be capable of orienting the at least one aperture in the path of the infrared light emitted by an infrared spectrophotometer or filtometer,

mounting the infrared light transmitting alkali halide crystal sample supporting substrate to the mounting means in a position wherein all or a centrally located part of the infrared light transmitting alkali halide crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

inserting the holder into the infrared spectrophotometer or infrared filtometer to allow the passage of a beam of infrared light through the infrared light transmitting alkali halide crystal sample supporting substrate to obtain one or more background scans of the absorbance of the infrared light transmitting alkali halide crystal sample supporting substrate,

placing a sample to be analyzed onto the infrared light transmitting alkali halide crystal sample supporting substrate,

inserting the holder into the infrared spectrophotometer or infrared filtometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light through the infrared light transmitting alkali halide crystal sample supporting substrate and the sample located thereon and with no other material within said at least one aperture that absorbs infrared light to obtain a scan of the absorbance of the sample and the infrared light transmitting alkali halide crystal sample supporting substrate, and,

using the one or more background scans to subtract the background absorbance of the infrared light transmitting alkali halide crystal sample supporting substrate without the sample from the absorbance of the sample and the infrared light transmitting alkali halide crystal sample supporting substrate.

47. A method for using a sample holder in an infrared spectrophotometer or infrared filtometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting alkali halide crystal material,

providing an infrared light transmitting alkali halide crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the infrared light transmitting alkali halide crystal sample

supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting alkali halide crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting alkali halide crystal sample supporting substrate from said infrared light transmitting alkali halide crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the infrared spectrophotometer or infrared filterometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting alkali halide crystal sample supporting substrate in the path of the infrared light emitted by the infrared spectrophotometer or filterometer,

mounting the infrared light transmitting alkali halide crystal sample supporting substrate to the mounting means in a position wherein all or a centrally located part of the infrared light transmitting alkali halide crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a medium onto the infrared light transmitting alkali halide crystal sample supporting substrate with which a sample will be mixed,

inserting the holder into the infrared spectrophotometer or infrared filterometer to allow the passage of a beam of infrared light through the medium and the infrared light transmitting alkali halide crystal sample supporting substrate to obtain one or more background scans of the infrared light transmitting alkali halide crystal sample supporting substrate and the medium,

placing a sample to be analyzed mixed with the medium onto the infrared light transmitting alkali halide crystal sample supporting substrate,

inserting the holder into the infrared spectrophotometer or infrared filterometer analytical instrument between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow infrared light through the infrared light transmitting alkali halide crystal sample supporting substrate and the medium mixed with the sample and with no other material other than the sample within said at least one aperture that absorbs infrared light and,

using the one or more background scans to subtract the absorbances of the medium and the infrared light transmitting alkali halide crystal sample supporting

substrate from the absorbances of the medium, the infrared light transmitting alkali halide crystal sample supporting substrate and the sample.

48. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting alkali halide crystal sample supporting substrate with which the sample will be mixed comprises placing an alkali halide crystal powder on the infrared light transmitting alkali halide crystal sample supporting substrate.

49. A method of using a sample holder as defined in claim 48 wherein said step of placing a medium onto the infrared light transmitting alkali halide crystal sample supporting substrate with which the sample will be mixed comprises placing KBr powder on the infrared light transmitting alkali halide crystal sample supporting substrate.

50. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared transmitting alkali halide crystal sample supporting substrate with which the sample will be mixed comprises placing mineral oil on the infrared transmitting alkali halide crystal sample supporting substrate.

51. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting alkali halide crystal sample supporting substrate with which the sample will be mixed comprises placing a solvent on the infrared light transmitting alkali halide crystal sample supporting substrate.

52. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting alkali halide crystal sample supporting substrate with which the sample will be mixed comprises placing a mixture of KBr powder and a solvent or a mineral oil on the infrared light transmitting alkali halide crystal sample supporting substrate.

53. A method for using a sample holder in an infrared spectrophotometer or infrared filter having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting alkali halide crystal material,

providing an infrared light transmitting alkali halide crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the infrared light transmitting alkali halide crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting alkali halide crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting alkali halide crystal sample supporting substrate from said infrared light transmitting alkali halide crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the spectrophotometer or filter, said mounting means being formed so as to be capable of orienting the infrared light transmitting sample supporting substrate in the path of the infrared light emitted by an infrared spectrophotometer or filter,

mounting the infrared light transmitting sample supporting substrate to the mounting means in a position where all or a centrally located part of the infrared light transmitting alkali halide crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a bacterial colony to be analyzed onto the infrared light transmitting alkali halide crystal sample supporting substrate,

inserting the mounting means into the spectrophotometer or filter between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light through the bacterial colony, the infrared light transmitting alkali halide crystal sample supporting substrate and the at least one aperture and with no other material other than the bacterial colony within said at least one aperture that absorbs infrared light.

## **APPENDIX B**

1. Copies of the evidence submitted under 37 CFR 1.130, 1.131, or 1.132 or any other evidence entered by the examiner and relied upon by the appellant in this appeal, along with a statement setting forth where in the record that evidence was entered by the examiner.

- A. Declaration under 37 CFR 132 of Dr. James de Haseth  
Received and entered in the U.S. Patent Office December 2, 2005  
De Haseth Declaration I
- B. Declaration under 37 CFR 132 of Robert Herpst  
Received and entered in the U.S. Patent office December 2, 2005  
Herpst Declaration I
- C. Declaration under 37 CFR 132 of Dr. James de Haseth  
Received and entered in the U.S. Patent Office February 27, 2006  
De Haseth Declaration II
- D. Declaration under 37 CFR 132 of Dr. James de Haseth  
Received and entered in the U.S. Patent office March 28, 2007  
De Haseth Declaration III
- E. Declaration under 37 CFR 132 of Dr. Edward Smolyarenko  
Received and entered in the U.S. Patent Office March 28, 2007  
Smolyarenko Declaration
- F. Declaration under 37 CFR 132 of Robert D. Herpst.  
Received and entered in the U.S. Patent Office December 2, 2005  
Herpst Declaration II

2. Copies of the decisions rendered by a court or the Board in the proceeding identified in the Related Appeals and Interference section of this brief.

NONE

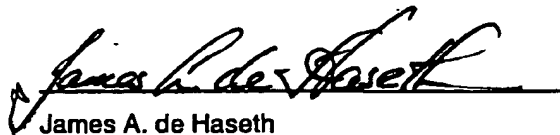


DECLARATION UNDER 37 CFR 1.132

I, Dr. James A. de Haseth, hereby declare as follows:

1. I am a Professor of Chemistry in the Department of Chemistry at the University of Georgia, Athens, Georgia and the co-author with Dr. Peter R. Griffiths of the textbook "Fourier Transform Infrared Spectrometry." I have an extensive background in the field of infrared spectroscopy and my curriculum vitae is attached hereto setting forth my qualifications and background in that field.
2. I have read and studied U.S. Patent application 09/977,664 of Robert D. Herpst and I am therefore familiar with the content of that application (hereinafter the "Herpst Application").
3. I have reviewed and understand all the claims of the Herpst Application.
4. As to claim 1 of the Herpst Application, I understand that a finished product, a sample holder, is claimed for use with an infrared spectrophotometer that has a throughbore and an infrared light transmitting support substrate located in that throughbore that allows the infrared light to pass through the substrate and no other material is present in that throughbore that would substantially absorb the infrared light and where the substrate is formed by one or more of the steps of cleaving, fly cutting, chipping, milling, or scaling, and the finished substrate is not precision optically polished.
5. It is my opinion, that it would be unexpected for one skilled in the art of spectroscopy to be able to construct a finished product in the form of a sample holder for an infrared spectrophotometer or infrared filterometer in accordance with the steps and recited features of that claim.
6. In my opinion, the same is true of claim 18 that is a method for the manufacture of a sample holder for use in an infrared spectrophotometer or infrared filterometer, and, again, a final product sample holder is achieved in a manner that is unexpected to me and I believe to those skilled in the art of spectroscopy.
7. Since the same limitation or descriptions that I have consider to result in the unexpected result discussed above are also present in later independent claims 30, 39, 45, 46, 47 and 53, it is my opinion that those claims describe an invention that achieves unexpected results.

I hereby declare that all statements made herein of my own knowledge are true and correct and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under 18 U.S. C. § 1001 and that such willful false statements may jeopardize the validity of the application of any patent issued under the above referenced application.

  
James A. de Haseth

# Curriculum Vitae

## Academic History

**Name:** James Andries de Haseth  
**Rank:** Professor of Chemistry  
**Education:** Bachelor of Science in Chemistry (ACS degree), University of Illinois at Chicago, 1972.  
Doctor of Philosophy in Analytical Chemistry, University of North Carolina at Chapel Hill, December 9, 1977. Research Director: Professor Thomas L. Isenhour. Dissertation: "Search and Differentiation Algorithms and Information Theory Applied to Chemical Spectroscopic and Biochemical Data."

## Academic Employment:

1978 - 1979	Postdoctoral Research Associate, University of Tennessee, Knoxville.
1979 - 1983	Assistant Professor of Chemistry, University of Alabama, University (Tuscaloosa).
1983 - 1987	Assistant Professor of Chemistry, University of Georgia, Athens.
1987 - 1992	Associate Professor of Chemistry, University of Georgia, Athens.
1992 - present	Professor of Chemistry, University of Georgia, Athens.

## Other Professional Employment:

1980 (Summer)	Research Chemist, U. S. Environmental Protection Agency, Southeast Environmental Research Laboratory, Athens, Georgia.
June 2003 - August 2004	Academic leave; U. S. Department of Agriculture, Agricultural Research Service, Quality Assessment Research Unit, Athens, Georgia.

## Awards and Honors:

August 1989	Lecture series on Fourier Transform Infrared Spectrometry, presented at the University of Utrecht, The Netherlands.
April 1990	Lecture series on the Applications of Fourier Transform Infrared Spectrometry, presented at Helsinki, Finland, and Stockholm, Sweden.
July 1989 & 1990	The Ellis R. Lippincott Memorial Lecturer, Bowdoin College, Bowdoin Infrared Course, Brunswick, Maine, July 21, 1989, and July 20, 1990.
May 1991	The Annual Chemistry Awards Day Lecturer, The University of Illinois at Chicago, Chicago, Illinois, May 30, 1991.



April 1992	A series of three lectures on Fourier Transform Infrared Spectrometry was presented at The University of Helsinki, Helsinki, Finland. Three lectures were presented
August 1992	A series of twenty-four lectures was presented on Fourier Transform Infrared Spectrometry. The lectures were presented at Auckland and Wellington in New Zealand, and at Sydney, Brisbane, Perth, Adelaide, Hobart and Melbourne in Australia.
July 1995	Richard C. Lord Lecturer of the Coblentz Society, 1995.
February 2000	A series of ten hours of lectures on chromatography and vibrational spectrometry was given to the Minnesota Chromatography Forum, Minneapolis, Minnesota.
March 2000	A series of seven hours of lectures on FT-IR spectrometry was given to the Pittsburgh Spectroscopy Society
November 2002	National Academies of Sciences, National Research Council Committee on Testing and Evaluation of Standoff Chemical Detectors.
July 2004	Richard C. Lord Lecturer of the Coblentz Society, 2004.
April 2005	Northeast Georgia Section of the American Chemical Society Research Chemist of the Year, 2004-2005.

## Research Areas

The major research focus is applications of Fourier transform infrared spectrometry, which includes the design of new spectrometers and interferometers. This research is being extended to the design of portable spectrometers for absorption and reflection in the UV through mid-IR regions, fluorescence, and Raman spectrometry. Research has also involved the interfacing of gas chromatography with FT-IR spectrometry for the development of analysis tools for the computerized identification of GC/FT-IR eluates. Liquid chromatographic interfaces for FT-IR spectrometry to record on-the-fly spectra of LC eluates have also been studied. The same technology has been used to study the dynamics of protein conformation. An additional interface between capillary electrophoresis and Fourier transform infrared spectrometry has been developed. The application of CE/FT-IR spectrometry is primarily for the study of complex carbohydrates. Vibrational Circular Dichroic studies with the use of FT-IR spectrometry have been pursued. Data processing in the Fourier domain for chemical and spectrometric data and applications of information theory to biochemical data are of interest.

## Scholarly Activities

## Publications

### Books authored or co-authored

Griffiths, P. R. and J. A. de Haseth, *Fourier Transform Infrared Spectrometry*, Wiley-Interscience, New York (1986), 656 pages.

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### Books edited

de Haseth, J. A., *Fourier Transform Spectroscopy: 11th International Conference*, American Institute of Physics Conference Proceedings, Woodbury, NY, 1998, 430, 753 pages.

### Chapters in books

de Haseth, J. A., "Fourier Transform Infrared Spectroscopy", in *Fourier, Hadamard and Hilbert Transforms in Chemistry*, A. G. Marshall, Ed., Plenum Press, New York (1982).

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de Haseth, J. A., W. S. Woodward and T. L. Isenhour, "Direct Optical Encoding of Recorded Spectra with a Computer Interfaced Vidicon Television Camera", *Analytical Chemistry*, **48**, 1513-1517 (1976).

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Sherman, J. W. and J. A. de Haseth, "Optimization of a Window Fourier Domain Search System", in *7th International Conference on Fourier Transform Spectroscopy*, David G. Cameron, Ed., *Society of Photo-Optical Instrumentation Engineers*, 1145, 423-424 (1989).

de Haseth, J. A. and R. F. Browner, "Development of a MAGIC Interface for HPLC/FT-IR", in *Thirteenth Annual EPA Conference on Analysis of Pollutants in the Environment*, Office of Water Regulations and Standards Industrial Technology Division, Document 21W-7005, USEPA, April 1991.

de Haseth, J.A. and J. E. Andrews, "Polyurethane Monitoring by Infrared Fiber Fourier Transform Spectrometry", in *8th International Conference on Fourier Transform Spectroscopy*, E. H. Korte, Ed., *Society of Photo-Optical Instrumentation Engineers*, 1575, 361-364 (1992).



- de Haseth, J. A., "Polymer Monitoring with Mid-IR Fibers", in *Optical Methods for Chemical Process Control*, S. Farquharson and J. M. Lerner, Eds., *Society of Photo-Optical Instrumentation Engineers*, 2069, 104-112 (1993).
- Turula, V. E. and J. A. de Haseth, "The Use of Particle Beam LC/Fourier Transform Infrared Spectrometry for the Structural Analysis of Globular Proteins: Preliminary Studies with b-Lactoglobulin", in *9th International Conference on Fourier Transform Spectroscopy*, J. E. Bertie, Ed., *Society of Photo-Optical Instrumentation Engineers*, 2089, 122-123 (1994).
- Bhat, S. A., J. A. Caughran, and J. A. de Haseth, "Study of Polyurethane Foam by Mid-Infrared Fiber/Fourier Transform Infrared Spectrometry", in *9th International Conference on Fourier Transform Spectroscopy*, J. E. Bertie, Ed., *Society of Photo-Optical Instrumentation Engineers*, 2089, 382-383 (1994).
- Caughran, J. A., Bhat, S. A., and J. A. de Haseth, "Correlations between Physical Properties, Formulations, and ATR FT-IR Spectra of Polyurethane Foams", in *9th International Conference on Fourier Transform Spectroscopy*, J. E. Bertie, Ed., *Society of Photo-Optical Instrumentation Engineers*, 2089, 384-385 (1994).
- Liang, X. and J. A. de Haseth, "The Studies of Chiral Separation Mechanisms by VCD/FT-IR Spectrometry", in *9th International Conference on Fourier Transform Spectroscopy*, J. E. Bertie, Ed., *Society of Photo-Optical Instrumentation Engineers*, 2089, 480-481 (1994).
- Turula, V. E. and J. A. de Haseth, "Production of Electrostatically Charged Globular Proteins by Induction Charging of a Liquid Jet with Fourier Transform Infrared Microscopy Detection", in *9th International Conference on Fourier Transform Spectroscopy*, J. E. Bertie, Ed., *Society of Photo-Optical Instrumentation Engineers*, 2089, 484-485 (1994).
- Liang, X. and J. A. de Haseth, "Studies of Polyurethane Foam Curing by Factor Analysis", in *9th International Conference on Fourier Transform Spectroscopy*, J. E. Bertie, Ed., *Society of Photo-Optical Instrumentation Engineers*, 2089, 508-509 (1994).
- Turula, V. E. and J. A. de Haseth, "Estimation of Globular Protein Solution Secondary Structure by Solvent Elimination Particle Beam LC/Fourier Transform Infrared Spectrometry: Correlation with Solution Measurements", in *9th International Conference on Fourier Transform Spectroscopy*, J. E. Bertie, Ed., *Society of Photo-Optical Instrumentation Engineers*, 2089, 516-517 (1994).
- Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "New Instruments for Measuring the Quality of Agricultural Commodities," *Proceedings of the 33<sup>rd</sup> U.S. Japan Natural Resource Panel*, Honolulu, pgs. 248-252 (2004).
- D. S. Himmelsbach, F. E. Barton, and J. A. de Haseth, "Using Two-Dimensional

Vibrational Correlation Spectroscopy to Study Agricultural Programs,"  
Proceedings of the 33<sup>rd</sup> U.S. Japan Natural Resource Panel, Honolulu, pgs. 254-  
262 (2004).

#### Book Reviews:

- Mamantov, G. and J. A. de Haseth, review of *Fourier Transform Infrared Spectroscopy: Applications to Chemical Systems*, Vol. 1, J. R. Ferraro and L. H. Basile, Eds., Academic Press, New York (1978), *Analytical Chemistry*, **51**, 83A (1979).
- de Haseth, J. A., review of *HRGC-FTIR: Capillary Gas Chromatography - Fourier Transform Infrared Spectroscopy*, by Werner Herres, Dr. Alfred Hüthig Verlag, Heidelberg (1987), *Journal of Chromatography*.
- de Haseth, J. A., review of *Infrared Spectroscopy: Analytical Chemistry by Open Learning*, by W. O. George and P. S. McIntyre, John Wiley & Sons, Chichester (1987), *Journal of the American Chemical Society*, **110**, 5238 (1988).
- de Haseth, J. A., review of *Laboratory Methods in Vibrational Spectroscopy*, 3rd ed., by H. A. Willis, J. H. van der Maas, and R. G. J. Miller, Eds., John Wiley & Sons, Chichester (1987), *Analytical Chemistry*, **61**, 308A (1989).
- de Haseth, J. A., review of *Chromatography/Fourier Transform Infrared Spectroscopy and Its Applications*, by R. White, Marcel Dekker, New York (1990), *Analytical Chemistry*, **62**, 1060A-1061A (1990).
- de Haseth, J. A., review of *Chromatography/Fourier Transform Infrared Spectroscopy and Its Applications*, by R. White, Marcel Dekker, New York (1990), *Applied Spectroscopy*, **45**(2), 20A (1991).

#### Other Publications

##### Editorial

- de Haseth, J. A., "Defining Our Terms", *Applied Spectroscopy*, **42**, 12A (1988).

##### Perspective

- de Haseth, J. A., "What is Analytical Chemistry?", *Spectroscopy International*, **1**(7), 22- 24 (1989), and *Spectroscopy*, **5**(1), 20-21 (1990).

## **Contributions other than formal publications**

### **Patents**

"Monodisperse Aerosol Generation Interface for LC/FT-IR Spectrometry", (joint with R. F. Browner, GIT). US Patent Number 4,924,097. Technology was licensed to Hewlett-Packard and Perkin-Elmer.

"Monodisperse Aerosol Generation Interface for LC/FT-IR Spectrometry", (joint with R. F. Browner, GIT). European Community Patent Number 90201174.1-2303.

"Monodisperse Aerosol Generation Interface for LC/FT-IR Spectrometry", (joint with R. F. Browner, GIT). Canadian and Japanese patents applied for.

"Monodisperse Aerosol Generator for Use with Infrared Spectrometry", (joint with R. F. Browner, GIT). US Patent Number 5,175,433.

"Monodisperse Aerosol Generator for Use with Infrared Spectrometry", (joint with R. F. Browner, GIT). European Community Patent Number 0455892A1.

### **Seminars presented at other institutions**

"Information Theory Applied to Protein Conformation", Emory University, Atlanta, Georgia, January 1980.

"Fourier Domain Processing in FT-IR", University of Alabama in Birmingham, Birmingham, Alabama, April 1980.

"Fourier Transform Infrared Spectrometry: Fourier Domain Studies", Middle Tennessee State University, Murfreesboro, Tennessee, October 1982.

"Spectrometric Investigations in the Fourier Domain", Georgia Institute of Technology, Atlanta, Georgia, February 1983.

"Fourier Transform Infrared Spectrometry", USDA, Athens, Georgia, January 1984.

"Fractals in Spectrometry", University of New Orleans, New Orleans, Louisiana, March 30, 1984.

"GC/FT-IR with Wide Bore Capillary Columns", Digilab Users' Group Meeting, Cambridge, Massachusetts, June 20, 1984.

"Wide Bore Capillary GC/FT-IR", USEPA, Las Vegas, Nevada, August 2, 1984.

"Gas Chromatography/Fourier Transform Infrared Spectrometric Information", Procter and Gamble Company, Cincinnati, Ohio, January 24, 1985.

"Gas and Liquid Chromatography/Fourier Transform Infrared Spectrometry", Burroughs Wellcome Company, Greenville, North Carolina, September 13, 1985.

"Infrared Structure Elucidation in the Fourier Domain", East Carolina University, Greenville, North Carolina, September 13, 1985.

"Time Resolved Infrared Spectrometry and Fourier Domain Structure Elucidation", Exxon Research and Engineering Company, Annandale, New Jersey, October 2, 1985.

"Countercurrent Chromatography/Fourier Transform Infrared (CCC/FT-IR) Spectrometry", Digilab Users' Group Meeting, Cambridge, Massachusetts, June 24, 1986.

"A Window Fourier Domain Infrared Search System", Standard Oil of Ohio, Cleveland, Ohio, September 17, 1986.

"Infrared Spectra of Liquid Chromatographic Eluates: The Countercurrent Approach", presented at James Madison University, Harrisonburg, Virginia, November 21, 1986.

"Spectral Identification in the Fourier Domain", presented at the University of Delaware, Newark, Delaware, February 20, 1987.

"MAGIC-LC/FT-IR Spectrometry", presented at the University of South Florida, Tampa, Florida, October 8, 1987.

"MAGIC-LC/FT-IR Spectrometry", presented at the University of Miami, Coral Gables, Florida, October 9, 1987.

"Vibrational Circular Dichroism FT-IR Spectrometry", presented at the University of Alabama at Birmingham, Birmingham, Alabama, January 29, 1988.

"MAGIC-LC/FT-IR Spectrometry", presented at the Spectroscopy Society of Pittsburgh, April 20, 1988.

"MAGIC-LC/FT-IR Spectrometry", presented at the Digilab User's Meeting, Cambridge, Massachusetts, June 21, 1988.

"Liquid Chromatography and Fourier Transform Infrared Spectrometry", presented at Bruker Analytische Messtechnik, Karlsruhe, Germany, December 9, 1988.

"An Introduction to Fourier Transform Infrared Spectrometry", presented at the Perkin-Elmer User's Meeting, Stockhölms, Sweden, December 14, 1988.

- "State-of-the-Art in GC/FT-IR Spectrometry", presented at the Perkin-Elmer User's Meeting, Stockholm, Sweden, December 14, 1988.
- "Infrared Fibers and Their Use in the Analysis of Polyurethane Flexible Foams", presented at Dow Chemical USA, Freeport, Texas, August 28, 1990.
- "The Use of Mid-Infrared Fibers as Remote Probes", presented at the Institute of Paper Science and Technology, Atlanta, Georgia, November 9, 1990.
- "Mid-Infrared Fibers as Remote Probes", presented at Los Alamos National Laboratories, Albuquerque, New Mexico, December 20, 1990.
- "Mid-Infrared Fibers and their Use in the Analysis of Polymers", presented at the Department of Chemistry, University of New Mexico, Albuquerque, New Mexico, February 27, 1991.
- "Mid-Infrared Fibers for Remote Sensing", presented at the Bio-Rad FT-IR Users' Meeting, Cambridge, Massachusetts, June 27, 1991.
- "Monitoring of Polyurethanes with Mid-Infrared Fibers", presented at the Institut für Physikalische Chemie der Universität zu Köln, Cologne, Germany, September 11, 1991.
- "Mid-Infrared Fibers for the Analysis of Polyurethane Foams and RIM Polyurethanes", presented at Dow Chemical USA, Freeport, Texas, September 23, 1991.
- "Mid-Infrared Probes", presented for the Analytical Science Discussion Group, Dow Chemical Company, Midland, Michigan, December 9, 1991.
- "Mid-Infrared Fiber Probes," presented at the Bio-Rad Users' Meeting (Europe), Dusseldorf, Germany, April 28, 1992.
- "Mid-infrared Fiber Probes", presented at the Society for Applied Spectroscopy Local Meeting, Chicago, Illinois, May 12, 1992.
- "Applications of Analytical FT-IR Spectrometry: Infrared Fiber Probes and HPLC/FT-IR Spectrometry", presented at Shell Development Company, Houston, Texas, August 17, 1993.
- "Applications of Analytical FT-IR Spectrometry: Infrared Fiber Probes and HPLC/FT-IR Spectrometry", presented at Clemson University, Clemson, South Carolina, September 30, 1993.
- "Mid-IR Fiber Probes", presented at Aristech Chemical Corporation, Monroeville, Pennsylvania, November 17, 1993.

- "Characterization of Protein Folding by Particle Beam FT-IR Spectrometry," presented at the Hercules Analytical Symposium, Hercules Corporation, Wilmington, Delaware, May, 1995.
- "The Use of Step-Scanning in FT-IR Spectrometry," presented at the Eastman Chemical Company, Kingsport, TN, February, 1998.
- "Process Monitoring with FT-IR Spectrometry," presented at the Eastman Chemical Company, Kingsport, TN, February, 1998.
- "Fourier Transform Infrared Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.
- "Quantitative Analysis with Fourier Transform Infrared Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.
- "Chromatography and Infrared Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.
- "Fourier Transform Near Infrared Raman Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.
- "Process Monitoring with FT-IR Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.
- "System Problems and Potential Errors with Fourier Transform Infrared Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.
- "Protein Conformation by Particle-Beam Infrared Spectrometry," presented at Waseda University, Tokyo, Japan, November, 1998.
- "The Determination of Carbohydrate Composition by FT-IR Spectrometry," presented at Kwansei-Gakuin University, Nishinomiya, Japan, November, 1998.
- "Quantitative Analysis of Complex Carbohydrates by FT-IR Microspectrometry," presented at a joint meeting of the Minnesota Section of the American Chemical Society and the Minnesota Local Section of the Society for Applied Spectroscopy, Minneapolis, Minnesota, February, 2000.
- "Capillary Electrophoresis/FT-IR Spectrometry," presented at Air Products Corporation, Incorporated, Allentown, Pennsylvania, July, 2000.
- "Analysis of Complex Carbohydrates by FT-IR Spectrometry and Chemometrics," presented at the University of Idaho, Moscow, Idaho, January 23, 2001.

"Capillary Electrophoresis/Fourier Transform Infrared Spectrometry for Carbohydrate Analysis," presented at the Complex Carbohydrate Research Center, University of Georgia, Athens, Georgia, February 28, 2001.

"FT-IR Instrumentation for the Process Control Industry," presented at Mettler Toledo AutoChem, Millersville, MD, January 2003.

"Process Control with Raman Spectrometry," presented at Mettler Toledo AutoChem, Millersville, MD, January 2003.

## **Recognitions and outstanding achievements**

Selected as a speaker for the Council for Chemical Research, 1984-1985.

Tour Speaker for the Society for Applied Spectroscopy, 1987.

Certificate of Merit, awarded by the Society for Applied Spectroscopy, October, 1990.

UGA Chemistry Professor of the Year, awarded by the UGA ACS Student Affiliates, 2001.

## **Supervision of Student Research**

### **Dissertations Directed**

- |   |                       |      |
|---|-----------------------|------|
| Denys François Leclerc  | University of Georgia | 1985 |
| "Fractal Phenomena in FT-IR Data Processing"  |                       |      |
| Current Employment: Pulp and Paper Research Institute of Canada, Vancouver, BC.   |                       |      |
| Paul Thomas Richardson  | University of Georgia | 1985 |
| "Fourier Transform Infrared Spectrometry: Environmental Problem Solving by Computerized Techniques"   |                       |      |
| Current Employment: E. I. DuPont de Nemours and Co., Wilmington, DE.  |                       |      |
| Rodolfo Jesus Románach  | University of Georgia | 1986 |
| "Development of CCC/FT-IR Spectrometry"   |                       |      |
| Current Employment: Associate Professor, University of Puerto Rico, Mayaguez, PR.   |                       |      |
| Ellen Victoria Nagy   | University of Georgia | 1988 |
| "The Use of Information Theory in the Prediction of Protein Secondary Structures"   |                       |      |
| Current Employment: Georgia Pacific, Decatur, GA.   |                       |      |
| Colleen Ann McCoy   | University of Georgia | 1988 |
| "Advances in Phase Correction and Measurement of Vibrational Circular Dichroism by Double Modulation Fourier Transform Infrared Spectrometry" |                       |      |

Current Employment: unknown. Left Georgia Pacific for medical school.

- Miron Gerard Still                      University of Georgia                      1989  
"Theoretical Studies of Chiral Stationary Phases"  
Current Employment: Whitehall Robbins, Richmond, VA.
- Raymond Marion Robertson      University of Georgia                      1989  
"Monodisperse Aerosol Generator Interface Combining Liquid Chromatography with  
Fourier Transform Infrared Spectrometry"  
Current Employment: Hoechst Celanese, Charlotte, NC.
- Jeffrey William Sherman              University of Georgia                      1990  
"Studies in Search and Classification Systems Using Window Fourier Domain Data"  
Current Employment: Mettler-Toledo AutoChem, Columbia, MD.
- Xu-Jin Lü                                      University of Georgia                      1991  
"Studies of Enantioselective Interactions in Chiral Separations by Fourier Transform  
Infrared Spectrometry"  
Current Employment: Bristol-Myers Squibb, Brunswick, NJ.
- Jennifer Elizabeth Andrews      University of Georgia                      1991  
"Mid-Infrared Fiber-Fourier Transform Infrared Spectrometry"  
Current Employment: Mettler-Toledo AutoChem, Atlanta, GA.
- Glenda Kay Ferguson                      University of Georgia                      1993  
"Investigation of Pharmaceutical Analyses with Monodisperse Aerosol Generator  
Interface Combining Liquid Chromatography with Fourier Transform Infrared (MAGIC-  
LC/FT-IR) Spectrometry"  
Current Employment: Associate Professor, Wesleyan College, Macon, GA.
- Vincent Edward Turula, Jr.              University of Georgia                      1995  
"Dynamic Solution Conformation of Biopolymers by Particle Beam LC/FT-IR  
Spectrometry"  
Current Employment: Wyeth Vaccines, Research Triangle Park, NC.
- Xihui Liang                                      University of Georgia                      1995  
"Target Transformation Factor Analysis in the Study of Polyurethane Foam Formation  
and Curing and VCD/FT-IR Spectrometry in the Determination of Chiral Separation  
Mechanisms"  
Current Employment: Pfizer, Inc., Groton, CT.
- Sanmitra Arvind Bhat                      University of Georgia                      1996  
"Study of Polyurethane Foams by Mid-Infrared Fiber/FT-IR Spectrometry and Study of  
Ester Crosslinking Reactions on Aluminum Surfaces by Infrared-ATR Spectrometry"  
Current Employment: Eastman Chemical, Kingsport, TN.
- Runhua Zhao                                      University of Georgia                      1996



"FT-IR Spectrometry and Capillary Electrophoresis in the Study of Carbohydrates"  
Current Employment: Johnson & Johnson, King of Prussia, PA.

Randall Todd Bishop                      University of Georgia                      1997  
"Solution Conformation of Peptides and Proteins under Reversed-Phase Chromatography  
by Particle Beam LC/FT-IR Spectrometry"  
Current Employment: Glaxo-Wellcome, Research Triangle Park, NC.

Richard Andrew Todebush                      University of Georgia                      2001  
"FT-IR Detection System for Capillary Electrophoresis and a Novel Deposition method  
for ATR"  
Current Employment: Kiel Laboratories, Gainesville, GA.

Richard Brian Melkowitz                      University of Georgia                      2002  
"The Analysis of Complex Carbohydrates by Fourier Transform Infrared  
Microspectrometry and Single-Bounce Attenuated Total Reflection Spectrometry"  
Current Employment: Noveon Plastics, Cleveland, OH.

Jessica Lea Jarman                      University of Georgia                      2003  
"Developments in Capillary Electrophoretic Instrumentation and FT-IR  
Spectrometric Detection, and Semi-Automated FT-IR Spectrometric Sample Deposition"  
Current Employment: GE Plastics, Mt. Vernon, IN

Andrew Gardner Adams Thomas                      University of Georgia                      2003  
"FT-IR Spectrometric Studies of Carbohydrates and Proteins"  
Current Employment: Gainesville College, Gainesville, GA.

### Theses Directed

Kalam Abul Mir                      University of Georgia                      1985  
"Computerized Structure Elucidation in Infrared Spectrometry"  
Current Employment: Formerly employed by the Armed Forces Food & Drug  
Laboratory, Bangladesh, now pursuing a Ph.D. at Queen's University, Kingston, Ontario,  
Canada

Cindy Robin Friedman                      University of Georgia                      1985  
"Gas Phase Rapid-Scanning Fourier Transform Infrared/Time-Resolved Spectrometry"  
Current Employment: Formerly employed by Spectra-Tech, Inc., Shelton, CT. Now  
marketing manager for a manufacturer of health equipment.

Hilda Velazquez                      University of Georgia                      1985  
"Very Wide-Bore Capillary Gas Chromatography"  
Current Employment: Universidad Nacional Experimental del Tachira, Venezuela

Maritza Ivonne Quifones                      University of Georgia                      1986  
"Wide Bore Capillary Gas Chromatography/Fourier Transform Infrared Spectrometry"  
Current Employment: United States Department of Agriculture, Athens, GA.

Seldon Penn Weaver                      University of Georgia                      1986  
"Gas-Phase Rapid-Scanning Fourier Transform Infrared/Time-Resolved Spectrometry (FT-IR/TRS)"  
Current Employment: Amorphous Silicon, Inc. Moses Lake, WA.

Julie Lynne Hust                      University of Georgia                      1991  
"A Window Fourier Domain Structural Search System"  
Current Position: unknown. Received doctorate in Chemical Education at Ohio University; may be teaching at the high school level.

Joel Allen Caughran                      University of Georgia                      1994  
"Correlations Between the Mechanical Properties and Attenuated Total Reflectance Infrared Spectra of Polyurethane Foams"  
Current Employment: Department of Chemistry, University of Georgia, Athens, GA.

William Maddux McClarin, III                      University of Georgia                      1995  
"Investigations of a Chiral Separation Mechanism Using Fourier Transform Infrared Spectrometry and Two-Dimensional Nuclear Magnetic Resonance Spectrometry"  
Current Employment: Thiele-Kaolin Corporation, Sandersville, GA.

Melissa Chanda Berry Medlin                      University of Georgia                      1996  
"Analytical Evaluation of Dialkyl Phosphates as Indicators of Organophosphorus Pesticide Exposure"  
Current Employment: Kimberly Clarke Corporation, Doraville, GA.

Yu Cang                      University of Georgia                      2000  
"Studies of Processed Cotton Fabrics and Dental restorative Resin Materials with the Use of Fourier Transform infrared Spectrometry"  
Current Employment: unknown. Pursued a graduate degree in Computer Science at the University of North Carolina at Charlotte.

Ushiri Kulatunga                      University of Georgia                      2000  
"Separation of Monosaccharides Found in Glycoproteins by Capillary Electrophoresis"  
Current Employment: Instructor, Athens Technical College, Athens, GA.

Tracey Leigh Cash                      University of Georgia                      2001  
"Applications of Capillary Electrophoretic Analysis"  
Current Employment: Eli Lilly and Company, Indianapolis, IN.

#### **Postdoctoral Research Associates**

Vincent E. Turula, Jr, 1995-1996  
Current Employment: Wyeth Vaccines, Research Triangle Park, NC.

Lin-Tao He, 1996-1997.  
Current Employment: Beijing Institute of Microchemistry, Beijing, China.

## Editorial responsibilities

- Associate Editor:** *Applied Spectroscopy* (1982-1993)  
*Applied Spectroscopy Reviews* (1995 -2001)
- Journal Referee:** *American Chemical Society Audio Courses*  
*American Chemical Society Symposium Series*  
*American Society for Testing and Materials Special Publications*  
*Analytical Chemistry*  
*Applied Spectroscopy*  
*Biophysical Journal*  
*Chemometrics and Intelligent Laboratory Systems*  
*Energy & Fuels*  
*Journal of Agricultural and Food Science*  
*Journal of the American Chemical Society*  
*Journal of Chemical Information and Computer Science*  
*Journal of Chromatography*  
*Journal of Chromatography A*  
*Journal of Computational Chemistry*  
*Journal of Environmental Monitoring*  
*Journal of High Resolution Chromatography and Chromatographic Communications*  
*Journal of Molecular Structure*  
*Journal of Physical Chemistry*  
*LC/GC The Magazine of Separation Science*  
*Planta*  
*Science*  
*Spectrochimica Acta, Part B*  
*Spectroscopy*  
*Talanta*  
*The Analyst*

## Papers Presented at Scientific Meetings

### Keynote Addresses

- de Haseth, J. A., "New Trends in Biomedical FT-IR Spectrometry", presented at the Fifth International Symposium on New Spectroscopic Methods in Biomedical Research, Seattle, Washington, October 1986.
- de Haseth, J. A., "Vibrational Spectrometry: Abreast with New Technology," presented at the First Australian Conference on Vibrational Spectroscopy, Sydney, New South Wales, Australia, February, 1995.

de Haseth, J. A., "Data Processing Pitfalls: Possible Problems with Spectral Data Processing and Sample Preparation," presented at the Third International Infrared Users' Group Meeting [of Art Conservationists and Art Preservationists], Winterthur, Delaware, May 28-30, 1998.

### **Plenary**

de Haseth, J. A., "Mathematics of Spectral Treatment in the Fourier Domain", presented at the 1985 International Conference on Fourier Transform and Computerized Infrared Spectroscopy, Ottawa, Ontario, Canada, June, 1985.

de Haseth, J. A., "MAGIC, VCD and Other Improbable Techniques", presented at the Meeting of the Infrared and Raman Discussion Group of Great Britain, King's College, University of London, London, England, December 15, 1988.

de Haseth, J. A., "Mid-Infrared Fibers and Probes," presented at the 10th International Conference on Fourier Transform Spectroscopy, Budapest, Hungary, August, 1995.

de Haseth, J.A., V.E. Turula, R.T. Bishop, and R. Zhao, "LC and CE/FT-IR Spectrometry in Trace Analysis," presented at the 26th International Symposium on Environmental Analytical Chemistry, Vienna, Austria, April, 1996.

de Haseth, J. A., "A Metal Nebulizer Capillary Electrophoresis/FT-IR Spectrometric Interface," Fifth International Symposium on Hyphenated Techniques in Chromatography and Hyphenated Chromatographic Analyzers, Bruges, Belgium, February, 2000.

de Haseth, J. A., "Capillary Electrophoresis/FT-IR Spectrometry," 30th International Symposium on Environmental Analytical Chemistry, Espoo, Finland, August, 2000.

### **Invited Presentations in Symposia**

de Haseth, J. A., "Bibliographic Text Searching on a Minicomputer", presented at the American Society Workshop on Computers in Chemistry, Chicago, Illinois, August 1975.

Isenhour, T. L., J. A. de Haseth, G. T. Rasmussen, and W. S. Woodward, "Visual Information Interpretation - A Low Cost Color Display System", presented at the Third Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, November 1976.

de Haseth, J. A., and T. L. Isenhour, "An Information Theoretical Approach to the Determination of Secondary Structure in Globular Proteins", presented at the 173rd American Chemical Society National Meeting, New Orleans, Louisiana, March 1977.

de Haseth, J. A., "An Interferogram-Based Search System for Vapor Phase Fourier Transform Data", presented at the Eighth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September 1981.

- de Haseth, J. A., and D. F. Leclerc, "Fractal Analysis Applied to Interferometric Searches", presented at the Ninth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September 1982.
- de Haseth, J. A., "Spectral Transformation: An Identification Tool", presented at the ASTM E-13.03 Infrared Spectroscopy Symposium, "The Computer: Friend or Foe", Ninth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September 1982.
- de Haseth, J. A., "Fractal Analysis of Time Domain Data", presented at the 36th Annual Summer Symposium on Analytical Chemistry, "Fourier Transforms and Their Applications to Instrumental Analysis", Lincoln, Nebraska, June 1983.
- de Haseth, J. A., "Stroboscopic FT-IR Spectroscopy - Past, Present and Future", presented at the 36th Annual Summer Symposium on Analytical Chemistry, "Fourier Transforms and Their Applications to Instrumental Analysis", Lincoln, Nebraska, June 1983.
- de Haseth, J. A., S. P. Weaver, P. T. Richardson, and R. J. Romañach, "Considerations on the Chromatography/Spectrometry Interface", presented at the 23rd Annual Eastern Analytical Symposium, New York, New York, November 14, 1984.
- de Haseth, J. A., D. F. Leclerc, and P. T. Richardson, "Fourier Transforms for Spectral Identification", presented at the 23rd Annual Eastern Analytical Symposium, New York, New York, November 15, 1984.
- de Haseth, J. A., and D. F. Leclerc, "Scaling Fractals in Spectrometry", presented at the 23rd Annual Eastern Analytical Symposium, New York, New York, November 15, 1984.
- de Haseth, J. A., "Fourier Domain Infrared Spectral Recognition", presented at the First Conference on Spectral Pattern Recognition, Aberdeen Proving Ground, Maryland, December 11, 1984.
- de Haseth, J. A., "Pesticide Analysis by GC and LC/FT-IR Spectrometry", presented at the 15th Annual Symposium on the Analytical Chemistry of Pollutants, Jekyll Island, Georgia, May 21, 1985.
- de Haseth, J. A., "Fractals: Discrete Mathematics for Optimization of Signal Versus Noise", presented at the Gordon Conference on Analytical Chemistry, New Hampton, New Hampshire, August 14, 1985.
- de Haseth, J. A. and R. J. Romañach, "High Speed Countercurrent Chromatography/Fourier Transform Infrared Spectrometry", presented at the 24th Annual Eastern Analytical Symposium, New York, New York, November 21, 1985.
- de Haseth, J. A., "High Speed Countercurrent Chromatography/Fourier Transform Infrared Spectrometry", presented at the 39th Annual Summer Symposium on Analytical

Chemistry, "Chromatographic/Spectroscopic Combinations", Salt Lake City, Utah, June 18, 1986.

de Haseth, J. A., "Computer-Assisted Identification of Infrared Spectra", presented at the Third International Conference on Diffuse Reflectance Spectroscopy, Chambersburg, Pennsylvania, August 20, 1986.

de Haseth, J. A. and R. J. Románach, "CCC/FT-IR Spectrometry", presented at the 13th Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, St. Louis, Missouri, October 3, 1986.

de Haseth, J. A., "New Trends in FT-IR: An Overview", presented at the 25th Annual Eastern Analytical Symposium, New York, New York, October 23, 1986.

de Haseth, J. A., "Fractals in FT-IR Spectrometry", presented at the Second Annual Scientific Computing and Automation Conference and Exposition, Atlantic City, New Jersey, November 7, 1986.

de Haseth, J. A., "Introduction to Fourier Transform Infrared Spectrometry", presented at the 193rd American Chemical Society National Meeting, Denver Colorado, April 5, 1987.

de Haseth, J. A., "Qualitative and Quantitative Analysis in the Fourier Domain", presented at the 193rd American Chemical Society National Meeting, Denver, Colorado, April 8, 1987.

de Haseth, J. A. and C. A. McCoy, "Advances in VCD-FT-IR Spectrometry", presented at the Pacific Conference on Chemistry and Spectroscopy, Irvine, California, October 29, 1987.

de Haseth, J. A., "Chemical Instrumentation Based upon the Fourier Transformation", presented at the Third Chemical Congress of North America, Toronto, Ontario, Canada, June 7, 1988.

de Haseth, J. A., "MAGIC-LC/FT-IR Spectrometry", presented at the 18th International Symposium on Environmental Analytical Chemistry and the 4th International Congress on Analytical Techniques in Environmental Chemistry, Barcelona, Spain, September 5, 1988.

de Haseth, J. A. and R. M. Robertson, "MAGIC-LC/FT-IR Spectrometry", presented at the Benedetti-Pichler Award Symposium Honoring Professor Richard F. Browner, 27th Eastern Analytical Symposium, New York, New York, October 6, 1988.

de Haseth, J. A. and C. A. McCoy, "FT-IR Vibrational Circular Dichroism Spectrometry: Status and Applications", 27th Eastern Analytical Symposium, New York, New York, October 7, 1988.

de Haseth, J. A., R. M. Robertson, and R. F. Browner, "MAGIC-LC/FT-IR Spectrometry", presented at the 15th Federation of Analytical and Spectroscopy Societies Meeting, Boston, Massachusetts, November 1, 1988.

- de Haseth, J. A., "Hyphenated Methods in Fourier Transform Infrared Spectrometry", presented at the Infrared and Raman Discussion Group of The Netherlands, The University of Utrecht, Holland, August 25, 1989.
- Browner, R. F. and J. A. de Haseth, "A Novel Interface for LC-Infrared Spectroscopy", presented at the International Symposium on Detection in Liquid Chromatography and Flow Injection Analysis (HPLC/FIA), Córdoba, Spain, September 21, 1989.
- de Haseth, J. A. and J. E. Andrews, "Fiber Optics Applications in the Mid-Infrared", presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.
- de Haseth, J. A., R. M. Robertson, and G. K. Ferguson, "A Practical Full Bandwidth Detector for Liquid Chromatography", presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.
- de Haseth, J. A. and R. F. Browner, "Development of a MAGIC Interface for HPLC/FT-IR", presented at the 13th Annual Conference on Analysis of Pollutants in the Environment, Norfolk, Virginia, May 9, 1990.
- de Haseth, J. A., "An Infrared Detection System for Liquid Chromatography", presented at the North Jersey Chromatography Meeting, Norwalk, Connecticut, June 8, 1990.
- de Haseth, J. A., "Infrared Spectrometry of Non-Traditional Samples", presented at the 11th Biennial Conference on Chemical Education, Atlanta, Georgia, August 7, 1990.
- Andrews, J. E. and J. A. de Haseth, "Kinetic Studies with the Use of Mid-Infrared Fibers", presented at 17th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Cleveland, Ohio, October 9, 1990.
- de Haseth, J. A., "Why FT-IR? An Overview", presented at the 35th Annual Meeting of the Biophysical Society, San Francisco, California, February 25, 1991.
- de Haseth, J. A. and J. E. Andrews, "Polyurethane Monitoring by Mid-Infrared Fiber Fourier Transform Spectrometry", presented at the 8th International Conference on Fourier Transform Spectroscopy, Lübeck-Travemünde, Germany, September 1-6, 1991.
- de Haseth, J. A., "Mid-infrared Fibers in Flexible Foams", presented at the Joint Meeting Federation of Analytical Chemistry and Spectroscopy Societies/Pacific Conference, Anaheim, California, October 6-11, 1991.
- de Haseth, J. A., R. D. Priester, Jr., J. V. McCluskey, and D. Cortelek, "Mid-Infrared Fiber Monitoring of RIM Polyurethanes", presented at the Joint Meeting Federation of Analytical Chemistry and Spectroscopy Societies/Pacific Conference, Anaheim, California, October 6-11, 1991.

- de Haseth, J. A., "Mid-Infrared Fiber Probes," presented at the Società Chimica Italiana, Divisione di Chimica Analytica, Gargnano (Brescia), Italy, April 22-23, 1992.
- de Haseth, J. A., "Polymer Monitoring with Mid-IR Fibers", presented at the International Symposium on Optical Tools for Manufacturing and Advanced Automation, Boston, Massachusetts, September 7-10, 1993.
- de Haseth, J. A., "Historical Perspectives of FT-IR Analytical Techniques", presented at the International Symposium on Optical Sensing for Environmental Monitoring, Atlanta, Georgia, October 11-14, 1993.
- de Haseth, J. A., R. Zhao, S. A. Bhat, X. Liang, and R. A. Dluhy, "Mid- and Near-IR Fiber Probes," presented at the 21st Federation of Analytical Chemistry and Spectroscopy Societies Meeting, St. Louis, Missouri, October, 1994.
- de Haseth, J. A., "The Use of Mid-Infrared Fibers in Polymer Analysis," presented at the First Australian Conference on Vibrational Spectroscopy, Sydney, New South Wales, Australia, February, 1995.
- de Haseth, J. A., "Vibrational Circular Dichroism/Fourier Transform Infrared Spectrometry of the Mechanisms in Chiral Separations," presented at the First Australian Conference on Vibrational Spectroscopy, Sydney, New South Wales, Australia, February, 1995.
- de Haseth, J. A., "The Investigation of Protein Conformation with the Use of Particle Beam/Infrared Spectrometry," presented at the First Australian Conference on Vibrational Spectroscopy, Sydney, New South Wales, Australia, February, 1995.
- de Haseth, J. A., "Infrared Spectrometry in Pesticide Analysis at the Sub-Nanogram Level," presented at the Southeastern Meeting of the Association of Official Analytical Chemists, Atlanta, Georgia, February, 1995.
- de Haseth, J.A., X. Liang, and S.A. Bhat, "Mid-Infrared Fiber Probes as Reaction Monitors," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 1995.
- de Haseth, J.A., "Infrared Spectrometry in the Near and Immediate Future," presented at the Eastern Analytical Symposium, Somerset, New Jersey, November, 1995.
- de Haseth, J.A., "Characterization of Protein Folding by Particle Beam FT-IR Spectrometry," presented at the Eastern Analytical Symposium, Somerset, New Jersey, November, 1995.
- de Haseth, J.A., V.E. Turula, and R.T. Bishop, "Protein Conformation by Particle Beam Infrared Spectrometry," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March, 1996.



- de Haseth, J. A., "Measurement of Dynamic Protein Conformation by Particle Beam LC/FT-IR Spectrometry," presented at the Eastern Analytical Symposium, Somerset, New Jersey, November, 1997.
- de Haseth, J. A., "Capillary Electrophoresis/FT-IR Spectrometry," to be presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 1998.
- de Haseth, J. A., "Combination of Proteolytic Digest and Deuterium Labeling for the Determination of Protein Structure," to have been presented at the American Chemical Society National Meeting, Boston, Massachusetts, August 23-27, 1998. [Withdrew; death in family.]
- de Haseth, J. A., "Particle Beam LC/FT-IR and CE/FT-IR Spectrometry," presented at the Spectroscopy Society of Japan National Meeting, Osaka, Japan, November 19-20, 1998.
- de Haseth, J. A., "Hyphenated Techniques and FT-IR Spectrometry: What's Wrong?," invited for presentation at the Eastern Analytical Symposium, Somerset, New Jersey, November, 1998. [Declined: this symposium coincided with the lectures in Japan.]
- de Haseth, J. A., "Successive Average Orthogonalization and Iterative Target Transformation Factor Analysis," Lectures on Chemometrics, Waseda University, Tokyo, Japan, August 22, 1999.
- de Haseth, J. A., "The Drive for Ultimate Sensitivity: Interfaces Between Separations Technologies and FT-IR Spectrometry," presented in the Williams-Wright Award Symposium at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 2001.
- de Haseth, J. A., "Composition of Oligosaccharides with the Use of Chemometrics and Infrared Spectrometry," presented at IUPAC International Congress on Analytical Sciences, Waseda University, Tokyo, Japan, August 7, 2001.
- de Haseth, J. A., "Errors and Anomalies in FTS," presented at the First International Conference on Advanced Vibrational Spectroscopy pre-conference symposium, Turku, Finland, August 21, 2001.
- de Haseth, J. A., "Specular and Internal Reflection Spectrometry," presented at the First International Conference on Advanced Vibrational Spectroscopy pre-conference symposium, Turku, Finland, August 21, 2001.
- de Haseth, J. A., "Univariate and Multivariate Quantitative Analysis," presented at the First International Conference on Advanced Vibrational Spectroscopy pre-conference symposium, Turku, Finland, August 21, 2001.

- de Haseth, J. A., R. A. Todebush, and J. L. Jarman, "Capillary Electrophoresis/Fourier Transform Infrared Spectrometry," presented at the Seventh International Symposium on Hyphenated Techniques in Chromatography, Brugges, Belgium, February 6-8, 2002.
- de Haseth, J. A. and J. L. Jarman, "Capillary Electrophoresis/FT-IR Spectrometry: How Small and How Useful?" to be presented in the Bornem-Michelson Award Symposium at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March 2003.
- Barton II, F. E., D. S. Himmelsbach, J. A. de Haseth, W. R. Windham, and W. H. Smith, "The Use of Interferometers and Imaging Spectrometers for Agricultural Applications," presented at the Australian NIR Group Meeting, Freemantle, W.A., Australia, April 17-20, 2004.
- Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "Moving from the Laboratory to the Field with NIR," International Diffuse Reflectance Conference, Chambersburg, PA, August 8-13, 2004.
- Himmelsbach, D. S., F. E. Barton II, and J. A. de Haseth, "Use of Two-dimensional Vibrational Correlation with Near-, Mid-Infrared and Raman Spectroscopy to Study Agricultural Problems," presented at the 31<sup>st</sup> Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Portland, OR, October 3-7, 2004.
- de Haseth, J. A., F. E. Barton II, and D. S. Himmelsbach, "End User Specification and justification of a New Field-Ready NIR Spectrometer Design," presented at the 31<sup>st</sup> Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Portland, OR, October 3-7, 2004.
- Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "Applications for a New Series of NIR Spectrometers," presented at the 31<sup>st</sup> Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Portland, OR, October 3-7, 2004.
- de Haseth, J. A. and Shelly I. Seerley, "Attenuated Total Reflection Direct-Deposition Nanosampler," presented at the 31<sup>st</sup> Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Portland, OR, October 3-7, 2004.
- Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "Applications for a New Series of NIR Spectrometers," presented at the Eastern Analytical Symposium, Sommerset, NJ, November 15-18, 2004.
- Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "New Instruments for Measuring the Quality of Agricultural Commodities," presented at the 33<sup>rd</sup> U.S. Japan Natural Resource Panel, Honolulu, HI, December 9-17, 2004.
- Himmelsbach, D. S., F. E. Barton, and J. A. de Haseth, "Using Two-Dimensional Vibrational Correlation Spectroscopy to Study Agricultural Programs," presented at the 33<sup>rd</sup> U.S. Japan Natural Resource Panel, Honolulu, HI, December 9-17, 2004.

#### **Submitted Presentations**

- Isenhour, T. L., H. B. Woodruff, S. R. Lowry, and J. A. de Haseth, "Text-Searching of Chemical Data Bases", presented at the 170th American Chemical Society National Meeting, Chicago, Illinois, August, 1975.
- de Haseth, J. A., H. B. Woodruff, and T. L. Isenhour, "Applications of Text-Searching for the Detection of Errors in Chemical Data Bases", presented at the 170th American Chemical Society National Meeting, Chicago, Illinois, August, 1975.
- de Haseth, J. A., W. S. Woodward, and T. L. Isenhour, "Direct Computer Encoding of Recorded Spectra", presented at the 27th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland, Ohio, March, 1976.
- de Haseth, J. A., H. B. Woodruff, S. R. Lowry, and T. L. Isenhour, "Text-Searching Applied to Mass Spectroscopy", presented at the 27th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland, Ohio, March, 1976.
- Rasmussen, G. T., J. A. de Haseth, W. S. Woodward, S. R. Lowry, and T. L. Isenhour, "Two Years Experience with an In-House Chemical Abstracts Current Awareness Service", presented at the 27th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland, Ohio, March, 1976.
- de Haseth, J. A., and T. L. Isenhour, "The Direct Reconstruction of Gas Chromatograms from Interferometric GC/IR Data", presented at the Second International Conference on Fourier Transform Infrared Spectroscopy, Columbia, South Carolina, June, 1977.
- de Haseth, J. A., A. A. Garrison, R. A. Crocombe, and G. Mamantov, "Time Resolved Infrared Investigations of Photolysis of Small Molecules", presented at the 31st Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1980.
- de Haseth, J. A., and L. V. Azarraga, "Initial Attempts to Reduce Interferometric Data for Efficient Infrared Searches", presented at the 32nd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1981.
- de Haseth, J. A., "Analysis of Spectral Anomalies in Rapid Scanning Fourier Transform Time-Resolved Infrared Spectrometry (TRS)", presented at the Third International Conference on Fourier Transform Infrared Spectroscopy, Columbia, South Carolina, June, 1981.
- de Haseth, J. A., "Interferometer Stability in Gas Chromatography/Fourier Transform Infrared Spectroscopy", presented at the Third International Conference on Fourier Transform Infrared Spectroscopy, Columbia, South Carolina, June, 1981.
- Azarraga, L. V., R. R. Williams, and J. A. de Haseth, "Initial Results from an Interferogram-Based Search System for GC/FT-IR", presented at the Third International Conference on Fourier Transform Infrared Spectroscopy, Columbia, South Carolina, June, 1981.

- de Haseth, J. A., and D. F. Leclerc, "Fractal Analysis Applied to FT-IR Interferograms", presented at the 33rd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1982.
- Leclerc, D. F., and J. A. de Haseth, "Interferogram Data Processing in FT-IR", presented at the 33rd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1982.
- de Haseth, J. A., and D. F. Leclerc, "Fractal Analysis Applied to Time Domain Signals", presented at the Ninth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September, 1982.
- Leclerc, D. F., and J. A. de Haseth, "Fractal Analysis and FT-IR", presented at the Ninth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September, 1982.
- Leclerc, D. F., and J. A. de Haseth, "Fractal Analysis Applied to Time-Domain Data Traces", presented at the 34th Southeastern Regional Meeting of the American Chemical Society, Birmingham, Alabama, November, 1982.
- Richardson, P. T., and J. A. de Haseth, "Improvements in Real-Time Analysis of GC/FT-IR Chromatograms", presented at the 34th Southeastern Regional Meeting of the American Chemical Society, Birmingham, Alabama, November, 1982.
- Weaver, S. P., and J. A. de Haseth, "Preliminary Studies in GC Parameters for GC/FT-IR", presented at the 34th Southeastern Regional Meeting of the American Chemical Society, Birmingham, Alabama, November, 1982.
- Lephardt, J. O., and J. A. de Haseth, "An Alternative Chromatogram Reconstruction Technique for GC/FT-IR", presented at the 34th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1983.
- Leclerc D. F., and J. A. de Haseth, "The Fractal Dimension of Time-Domain Signals: Analysis and Applications to Transform Techniques", presented at the 34th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1983.
- Richardson, P. T., and J. A. de Haseth, "A Novel Algorithm for the Isolation of Eluate Peaks in GC/FT-IR Reconstructed Chromatograms", presented at the 34th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1983.
- Weaver, S. P., and J. A. de Haseth, "Modifications of GC Parameters for Improvements in GC/FT-IR", presented at the 34th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1983.

- Richardson, P. T., and J. A. de Haseth, "An Improved Technique for Processing GC/FT-IR Reconstructed Chromatograms", presented at the 13th Annual Symposium on the Analytical Chemistry of Pollutants, Jekyll Island, Georgia, May, 1983.
- de Haseth, J. A., "The Gram-Schmidt Vector Orthogonalization Algorithm and Its Applications to FT-IR", presented at the 4th International Conference on Fourier Transform Spectroscopy, Durham, U. K., September, 1983.
- de Haseth, J. A., "Spectral Search Techniques in FT-IR Spectroscopy", presented at the 35th Southeastern Regional Meeting of the American Chemical Society, Charlotte, North Carolina, November, 1983.
- Leclerc, D. F., and J. A. de Haseth, "Scaling Fractals in FT-IR", presented at the 35th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1984.
- Coates, J. P., and J. A. de Haseth, "An Evaluation of Infrared Search Algorithm Philosophies for Practical Analytical Applications", presented at the 36th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, February, 1985.
- Romañach, R. J., and J. A. de Haseth, "High Speed Countercurrent Chromatography/Fourier Transform Infrared Spectrometry", presented at the 36th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, February, 1985.
- Richardson, P. T., and J. A. de Haseth, "An Interferogram Based Structure Elucidation Algorithm for Gas Chromatography/Fourier Transform Infrared Spectrometry", presented at the 36th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, February, 1985.
- Friedman, C. R., S. P. Weaver, and J. A. de Haseth, "Gas-Phase Time-Resolved Rapid-Scanning Fourier Transform Infrared (FT-IR) Spectrometry", presented at the 36th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, February, 1985.
- de Haseth, J. A., "Time Resolved Fourier Transform Infrared Spectrometry - Temperature Jump Experiments", presented at the Southeastern Association of Analytical Chemists Meeting, Athens, Georgia, April, 1985.
- Romañach, R. J., J. A. de Haseth, and Y. Ito, "High Speed Countercurrent Chromatography/Fourier Transform Infrared (HSCCC/FT-IR) Spectrometry - Preliminary Studies", Seventh Atlanta Chromatography Symposium, Atlanta, Georgia, May, 1985.

- Friedman, C. R., and J. A. de Haseth, "Rapid Scanning FT-IR/Time Resolved Spectrometry (TRS) for Gas Phase Systems", presented at the Fifth International Conference on Fourier and Computerized Infrared Spectroscopy, Ottawa, Ontario, Canada, June, 1985.
- Richardson, P. T., and J. A. de Haseth, "Structural Analysis Using Interferometric Data", presented at the Fifth International Conference on Fourier and Computerized Infrared Spectroscopy, Ottawa, Ontario, Canada, June, 1985.
- Weaver, S. P., and J. A. de Haseth, "Methods Development for Rapid-Scanning Gas Phase Fourier Transform Infrared/Time-Resolved (FT-IR/TRS) Spectrometry", presented at the Fifth International Conference on Fourier and Computerized Infrared Spectroscopy, Ottawa, Ontario, Canada, June, 1985.
- Romañach, R. J., and J. A. de Haseth, "High Speed Countercurrent Chromatography/Fourier Transform Infrared (HSCCC/FT-IR) Spectrometry", presented at the Fifth International Conference on Fourier and Computerized Infrared Spectroscopy, Ottawa, Ontario, Canada, June, 1985.
- Tripodi, E. V., and J. A. de Haseth, "The Determination of the Secondary Structure of Proteins Using an Information Theoretical Approach", presented at the 37th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1986.
- McCoy, C. A., and J. A. de Haseth, "Phase Correction in Vibrational Circular Dichroism FT-IR Spectrometry", presented at the 37th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1986.
- McCoy, C. A., and J. A. de Haseth, "Peak Identification and Characterization of FT-IR Vapor Phase Spectra", presented at the 37th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1986.
- Romañach, R. J., and J. A. de Haseth, "High Speed Countercurrent Chromatography/Fourier Transform Infrared (CCC/FT-IR) Spectrometry", presented at the 37th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1986.
- de Haseth, J. A., "Countercurrent Chromatography/Fourier Transform Infrared (CCC/FT-IR) Spectrometry", presented at the Southeastern Association of Analytical Chemists Meeting, Greenville, North Carolina, April, 1986.
- McCoy, C. A., and J. A. de Haseth, "Advances in Phase Correction of Vibrational Circular Dichroism FT-IR Spectrometry", presented at the 13th Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, St. Louis, Missouri, September, 1986.

- Tripodi, E. V., and J. A. de Haseth, "Computer-Assisted Prediction of Globular Protein Structure", presented at the 38th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1987.
- Robertson, R. M., J. A. de Haseth, and R. F. Browner, "MAGIC-LC/FT-IR Spectrometry", presented at the Sixth International Conference on Fourier Transform Spectroscopy, Vienna, Austria, August 1987.
- Sherman, D. C. and J. A. de Haseth, "Temperature-Jump FT-IR Time-Resolved Spectrometry", presented at the Sixth International Conference on Fourier Transform Spectroscopy, Vienna, Austria, August 1987.
- Sherman, J. W. and J. A. de Haseth, "A Window Fourier Domain Infrared Search System", presented at the Sixth International Conference on Fourier Transform Spectroscopy, Vienna, Austria, August 1987.
- Tripodi, E. V. and J. A. de Haseth, "Incorporation of FT-IR Spectral Data in a Computer-Assisted Prediction of Globular Protein Structure", presented at the Sixth International Conference on Fourier Transform Spectroscopy, Vienna, Austria, August 1987.
- McCoy, C. A. and J. A. de Haseth, "Modified Phase Correction Algorithms in VCD/FT-IR Spectrometry", presented at the Sixth International Conference on Fourier Transform Spectroscopy, Vienna, Austria, August 1987.
- Robertson, R. M., J. A. de Haseth and R. F. Browner, "MAGIC-LC/FT-IR Spectrometry", presented at the 39th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, February 1988.
- Tripodi, E. V. and J. A. de Haseth, "Prediction of Protein Secondary Structure Using a Combination of FT-IR Spectral Data and an Information Theoretical Approach", presented at the 39th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, February 1988.
- Sherman, J. W. and J. A. de Haseth, "Effects of Contaminants and Mixtures on Window Fourier Domain Search Results", presented at the 39th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, February 1988.
- McCoy, C. A. and J. A. de Haseth, "Modified Phase Correction Algorithms in VCD/FT-IR Spectrometry", presented at the 39th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, February 1988.
- de Haseth, J. A., "VCD-FT-IR Spectrometry", presented at the Southeastern Association of Analytical Chemists Meeting, Knoxville, Tennessee, April 22, 1988.
- McCoy, C. A. and J. A. de Haseth, "Measurement of VCD Spectra with Minimal Optical Bias", presented at the 15th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Boston, Massachusetts, November 3, 1988.

- Still, M. G., L. B. Rogers and J. A. de Haseth, "Fourier Transform Infrared Spectrometry of Complexes Involved in Chiral Separations", presented at the 40th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlanta, Georgia, March 1989.
- Robertson, R. M. and J. A. de Haseth, "Transport Efficiency of MAGIC-LC/FT-IR Spectrometry", presented at the 40th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlanta, Georgia, March 1989.
- Nagy, E. V. and J. A. de Haseth, "Statistical Analysis of a Database of Proteins with Known Secondary Structure", presented at the 40th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlanta, Georgia, March 1989.
- McCoy, C. A. and J. A. de Haseth, "A Comparison of Minimal Optical Bias Configuration in the FT-IR Measurement of Vibrational Circular Dichroic Spectra", presented at the 40th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlanta, Georgia, March 1989.
- Andrews, J. A. and J. A. de Haseth, "Fiber Optical FT-IR Spectrometry of Laminates", presented at the 7th International Conference on Fourier Transform Spectroscopy, Fairfax, Virginia, June 1989.
- Ferguson, G. K. and J. A. de Haseth, "Detection Parameters in MAGIC-LC/FT-IR Spectrometry", presented at the 7th International Conference on Fourier Transform Spectroscopy, Fairfax, Virginia, June 1989.
- Sherman, J. W. and J. A. de Haseth, "Classification of Compounds using a Window Fourier Domain System", presented at the 7th International Conference on Fourier Transform Spectroscopy, Fairfax, Virginia, June 1989.
- Sherman, J. W. and J. A. de Haseth, "Optimization of a Window Fourier Search System", presented at the 7th International Conference on Fourier Transform Spectroscopy, Fairfax, Virginia, June 1989.
- Robertson, R. M., J. A. de Haseth and R. F. Browner, "Buffered Mobile Phases with MAGIC-LC/FT-IR", presented at the 7th International Conference on Fourier Transform Spectroscopy, Fairfax, Virginia, June 1989.
- Robertson, R. M., G. K. Ferguson, and J. A. de Haseth, "MAGIC-LC/FT-IR: No Chromatographic Compromise", presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.
- Ferguson, G. K. and J. A. de Haseth, "Optimization of Desolvation Parameters for MAGIC-LC/FT-IR Spectrometry", presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.



- Lü, X-J., L. B. Rogers, and J. A. de Haseth, "The Studies of Enantioselective Interaction in Chiral Separations by Fourier Transform Infrared Spectrometry", presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.
- Andrews, J. E. and J. A. de Haseth, "Investigation of Polymer Kinetics with Infrared Fiber Optics", presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.
- Sherman, J. W., G. K. Ferguson, and J. A. de Haseth, "Principal Component Regression Analysis of Polyurethane Plaques Using Attenuated total Reflectance Spectra", presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.
- Harthcock, M. A., S. Nitzsche, B. L. Davis, J. A. de Haseth, and R. M. Robertson, "Functional Group Images (FGI) by Infrared Microspectroscopy: Recent Applications and Effective Spatial Resolution Enhancement", presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.
- Edman, K. R., R. F. Browner, and J. A. de Haseth, "LC-FTIR: Dynamics within the Particle Beam Interface", presented at the 41st Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New York, New York, March 8, 1990.
- Lü, X-J. and J. A. de Haseth, "The Measurement of Zidovudine in Serum by MAGIC-LC/FT-IR Spectrometry", presented at the 17th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Cleveland, Ohio, October 9, 1990.
- Lü, X-J., L. B. Rogers, and J. A. de Haseth, "The Studies of Relative Resolving Power in Chiral Separations by Fourier Transform Infrared Spectrometry", presented at the 17th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Cleveland, Ohio, October 11, 1990.
- Ferguson, G. K., J. A. de Haseth, and R. F. Browner, "Pharmaceutical Separations with MAGIC-LC/FT-IR Spectrometry", presented at the 17th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Cleveland, Ohio, October 12, 1990.
- Hust, J. L. and J. A. de Haseth, "Optimization of Optical Parameters for MAGIC-LC/FT-IR Spectrometry", presented at the 17th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Cleveland, Ohio, October 10, 1990.
- Lü, X-J., L. B. Rogers, and J. A. de Haseth, "2D-NMR Studies of the Enantioselective Interaction in Chiral Separations of HPLC", presented at the 42nd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March 5, 1991.

- Andrews, J. E. and J. A. de Haseth, "Factor Analysis of Polyurethane Foam Spectra", presented at the 42nd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March 6, 1991.
- Edman, K. R., R. F. Browner, and J. A. de Haseth, "Particle Dynamics within the LC-FTIR Particle Beam Interface", presented at the 42nd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March 6, 1991.
- Lü, X-J. and J. A. de Haseth, "The Measurement of Zidovudine and Its Metabolite in Urine by MAGIC-LC/FT-IR Spectrometry", presented at the 42nd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March 6, 1991.
- Powell, D. A., V. Turula, J. A. de Haseth, H. van Halbeek, and B. Meyer, "Detection of Sulfate in Oligosaccharaides by Neural Network Analysis of Fourier-Transform Infrared Spectra", presented at the 11th International Symposium of Glycoconjugates, Ottawa, Canada, June 1991.
- Turula, V. E., J. A. de Haseth, and R. F. Browner, "Fundamentals of the MAGIC Interface", presented at the 1991 Joint Meeting Federation of Analytical Chemistry and Spectroscopy Societies/Pacific Conference, Anaheim, California, October 6-11, 1991.
- Edman, K. R., R. F. Browner, and J. A. de Haseth, "Particle Dynamics within the LC-FTIR Particle Beam Interface", presented at the 43rd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 9-13, 1992.
- Hust, J. L. and J. A. de Haseth, "A Windowing Fourier Domain Structural Search System", presented at the 43rd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 9-13, 1992.
- Ferguson, G. K., R. F. Browner, and J. A. de Haseth, "Pharmaceutical Separations by MAGIC-LC/FT-IR Spectrometry", presented at the 43rd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 9-13, 1992.
- Liang, X., J. E. Andrews and J. A. de Haseth, "Resolution of Component Spectra Using Successive Average Orthogonalization and Iterative Target Transform Factor Analysis," presented at the 19th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Philadelphia, Pennsylvania, September 20-25, 1992.
- Turula, Jr., V. E. and J. A. de Haseth, "Estimation of Globular Protein Secondary Structure by Solvent-Elimination MAGIC-LC/FT-IR Spectrometry," presented at the 19th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Philadelphia, Pennsylvania, September 20-25, 1992.
- Caughran, J. A., W. M. McClarin, III, M. C. Berry, S. A. Bhat, K. Braden, and J. A. de Haseth, "Effect of Surfactant in Polyurethane Foams Monitored by Mid-Infrared Fiber Fourier

Transform Spectrometry," presented at the 19th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Philadelphia, Pennsylvania, September 20-25, 1992.

- Bhat, S. A., M. C. Berry, and J. A. de Haseth, "Mid-Infrared Fiber/Fourier Transform Infrared Spectroscopy Study of Surfactants and Catalysts during Polyurethane Foam Formation", presented at the 44th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlanta, Georgia, March 8-12, 1993.
- Edman, K. R., R. F. Browner, and J. A. de Haseth, "Particle Dynamics within the LC/FT-IR Particle Beam Interface", presented at the 44th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlanta, Georgia, March 8-12, 1993.
- Turula, V. E. and J. A. de Haseth, "The Use of Particle Beam LC/Fourier Transform Infrared Spectrometry for the Structural Analysis of Globular Proteins: Preliminary Studies with b-Lactoglobulin", presented at the 9th International Conference on Fourier Transform Spectroscopy, Calgary, Alberta, Canada, August 23-27, 1993.
- Bhat, S. A., J. A. Caughran, and J. A. de Haseth, "Study of Polyurethane Foam by Mid-Infrared Fiber/Fourier Transform Infrared Spectrometry", presented at the 9th International Conference on Fourier Transform Spectroscopy, Calgary, Alberta, Canada, August 23-27, 1993.
- Caughran, J. A., Bhat, S. A., and J. A. de Haseth, "Correlations between Physical Properties, Formulations, and ATR FT-IR Spectra of Polyurethane Foams", presented at the 9th International Conference on Fourier Transform Spectroscopy, Calgary, Alberta, Canada, August 23-27, 1993.
- Liang, X. and J. A. de Haseth, "The Studies of Chiral Separation Mechanisms by VCD/FT-IR Spectrometry", presented at the 9th International Conference on Fourier Transform Spectroscopy, Calgary, Alberta, Canada, August 23-27, 1993.
- Turula, V. E. and J. A. de Haseth, "Production of Electrostatically Charged Globular Proteins by Induction Charging of a Liquid Jet with Fourier Transform Infrared Microscopy Detection", presented at the 9th International Conference on Fourier Transform Spectroscopy, Calgary, Alberta, Canada, August 23-27, 1993.
- Liang, X. and J. A. de Haseth, "Studies of Polyurethane Foam Curing by Factor Analysis", presented at the 9th International Conference on Fourier Transform Spectroscopy, Calgary, Alberta, Canada, August 23-27, 1993.
- Turula, V. E. and J. A. de Haseth, "Estimation of Globular Protein Solution Secondary Structure by Solvent Elimination Particle Beam LC/Fourier Transform Infrared Spectrometry: Correlation with Solution Measurements", presented at the 9th International Conference on Fourier Transform Spectroscopy, Calgary, Alberta, Canada, August 23-27, 1993.

- Turula, V. E. and J. A. de Haseth, "Separation and Characterization of Globular Proteins by High Performance Hydrophobic Interaction Chromatography Particle Beam LC/FT-IR Spectrometry", presented at the 45th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, February 27 - March 4, 1994.
- Liang, X. and J. A. de Haseth, "Studies of Enantioselective Interaction in Chiral Separation with the Use of VCD/FT-IR Spectrometry", presented at the 45th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, February 27 - March 4, 1994.
- Bhat, S. A. and J. A. de Haseth, "Infrared Temperature Studies of Hydrogen Bonding in Polyurethane Foam", presented at the 45th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, February 27 - March 4, 1994.
- Zhao, R. and J. A. de Haseth, "Near-IR Studies of Polyurethane Foam by the Use of Sapphire Optical Fiber", presented at the 45th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, February 27 - March 4, 1994.
- Turula, V. E. and J. A. de Haseth, "Dynamic Solution Structure of Globular Proteins by Reversed-phase HPLC Particle Beam LC/FT-IR Spectrometry", presented at the 46th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 5-10, 1995.
- Bhat, S.A. and J.A. de Haseth, "Correlations of Attenuated Total Reflectance Spectra to Physical Properties of Polyurethane Foams," presented at the 10th International Conference on Fourier Transform Spectroscopy, Budapest, Hungary, August 27 - September 1, 1995.
- Bishop, R. and J.A. de Haseth, "Conformational Effects of Reversed-phase HPLC on Ribonuclease A by Particle Beam LC/FT-IR Spectrometry," presented at the 10th International Conference on Fourier Transform Spectroscopy, Budapest, Hungary, August 27 - September 1, 1995.
- Bhat, S.A. and J.A. de Haseth, "FT-IR Analysis of Polyurethane Foams with the Use of Mid-Infrared Fibers," presented at the 10th International Conference on Fourier Transform Spectroscopy, Budapest, Hungary, August 27 - September 1, 1995.
- Venkateshwaran, T.G., J.T. Stewart, J.A. de Haseth, R.T. Bishop, and V.E. Turula, "HPLC/FT-IR: A New Approach to Study the Stability of Peptides in Parenteral Solutions," presented at the International Symposium of Peptides, Proteins and Polynucleotides '95, Boston, Massachusetts, November, 1995.
- Venkateshwaran, T.G., J.A. de Haseth, R.T. Bishop, and V.E. Turula, "Secondary Structure of Unfolded Proteins by Reversed Phase HPLC Particle Beam/FT-IR Spectrometry and Capillary Zone Electrophoresis," presented at the International Symposium of Peptides, Proteins and Polynucleotides '95, Boston, Massachusetts, November, 1995.

- Turula, V.E., R.T. Bishop, and J.A. de Haseth, "Time-Resolved FT-IR Studies of Protein Folding Mechanisms: Part I. Preparation, Isolation, and Characterization of Unfolded Proteins," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March, 1996.
- Bishop, R.T., V.E. Turula, and J.A. de Haseth, "Time-Resolved FT-IR Studies of Protein Folding Mechanisms: Part II. Particle Beam Detection," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March, 1996.
- Bhat, S.A. and J.A. de Haseth, "Partial Least Squares: Correlation of Physical Properties to Infrared Spectra of Polyurethane Foams," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March, 1996.
- Liang, X. and J.A. de Haseth, "The Study of the Formation and Curing of Flexible Polyurethane Foams by Factor Analysis," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March, 1996.
- Zhao, R. and J.A. de Haseth, "Carbohydrate Analysis Using FT-IR/Microscopy and the Hyphenation of CE/FT-IR Spectrometry," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March, 1996.
- Medlin, M.B., Jain, A.V., and J.A. de Haseth, "A Rapid Method of Detection of Organophosphorus Insecticide Metabolites by Gas Chromatography-Flame Photometric Detection," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March, 1996.
- Venkateshwaran, T.G., J.T. Stewart, J.A. de Haseth, R.T. Bishop, and V.E. Turula, "Secondary Structure Studies of Peptides/Polypeptides using LC/FT-IR: A Method to Estimate the Stability of Peptides/Polypeptides in Parenteral Solutions," presented at the 20th International Symposium on High Performance Liquid Phase Separations (HPLC '96), San Francisco, California, June, 1996.
- Turula, V.E., R.T. Bishop, R.D. Ricker, and J.A. de Haseth, "Complete Structural Elucidation of a Globular Protein by Particle Beam LC/FT-IR and Electrospray LC/MS: Sequence and Conformation of b-Lactoglobulin," presented at the 20th International Symposium on High Performance Liquid Phase Separations (HPLC '96), San Francisco, California, June, 1996.
- Bishop, R. T., J. A. de Haseth, T. G. Venkateshwaran, J. T. Stewart, and M. G. Bartlett, "Conformational Effects of Reversed Phase Chromatography of Rnase A with Electrospray LC-MS and Particle Beam LC/FT-IR Spectrometry," presented at the 8th International Symposium on Pharmaceutical and Biomedical Analysis, Orlando, Florida, May 4-7, 1997.
- He, L-T. and J. A. de Haseth, "Capillary CE/FT-IR Spectrometry," presented at the 27th International Symposium on Environmental Analytical Chemistry, Jekyll Island, Georgia, June, 1997.

- Bishop, R. T., T. G. Venkateshwaran, J. A. de Haseth, J. T. Stewart, and M. G. Bartlett, "Protein Conformational Analysis under Reversed Phase HPLC Conditions by Particle Beam LC/FT-IR Spectrometry and Electrospray LC/MS," presented at the 11th International Conference on Fourier Transform Spectroscopy, Athens, Georgia, August, 1997.
- Bishop, R. T. and J. A. de Haseth, "Deuterium Labeling for Analysis of Reversed-Phase Interaction," presented at the 11th International Conference on Fourier Transform Spectroscopy, Athens, Georgia, August, 1997.
- He, Lin-Tao and J. A. de Haseth, "Metal Nebulizer CE/FT-IR Interface," presented at the 11th International Conference on Fourier Transform Spectroscopy, Athens, Georgia, August, 1997.
- He, Lin-Tao and J. A. de Haseth, "Quantitative Analysis of Monosaccharide Component Ratios by FT-IR Microscopy and Partial Least Squares (PLS)," presented at the 11th International Conference on Fourier Transform Spectroscopy, Athens, Georgia, August, 1997.
- Bhat, S. A., C. Q. Yang, and J. A. de Haseth, "Study of Ester Crosslinking Reactions on Aluminum Surfaces by Infrared Attenuated Total Reflectance Spectrometry," presented at the 11th International Conference on Fourier Transform Spectroscopy, Athens, Georgia, August, 1997.
- Todebush, R. A. and J. A. de Haseth, "The Use of Particle Beam LC-FTIR and LC-MS for the Characterization of Deuterated Enzymatically Digested Horse Heart Cytochrome C," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March, 1999.
- Melkowitz, R. B., S. P. Altomari, J. A. de Haseth, and S. B. Lavery, "Monosaccharide Composition Analysis by Infrared Microspectrometry," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March, 1999.
- Melkowitz, R. B. and J. A. de Haseth, "FT-IR Microspectrometric Analysis of Complex Carbohydrates," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 2000.
- Melkowitz, R. B., J. A. de Haseth, and S. B. Lavery, "Single-Bounce ATR/FT-IR Microspectrometric Analysis of Complex Carbohydrates," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 2001.
- Todebush, R. A. and J. A. de Haseth, "Microconcentric CE/FT-IR Nebulizer," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 2001.

- Thomas, A. G. A., M. Corredig, and J. A. de Haseth, "ATR/FT-IR Spectrometric Analysis of Protein Secondary Structural Changes in Emulsions," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 2001.
- Todebush, R. A. J. L. Jarman, and J. A. de Haseth, "Semi-Automated Sample Deposition System," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 2001.
- Jarman, J. L. and J. A. de Haseth, "FT-IR Spectrometric Detection for Capillary Electrophoresis," presented at the Federation of Analytical Chemistry and Spectroscopy Societies, Detroit, Michigan, October, 2001.
- Jarman, J. L., R. A. Todebush, and J. A. de Haseth, "FT-IR Spectrometric Detection for Capillary Electrophoretic Analyses," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 2002.
- Jarman, J. L., S. I. Seerley, and J. A. de Haseth, "Semi-Automatic Sample Deposition and its Application to ATR/FT-IR Spectrometric Analysis," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 2002.
- Jarman, J. L., S. I. Seerley, and J. A. de Haseth, "Precision and Reproducibility of Semi-Automated Sample Deposition for FT-IR/ATR Analyses," presented at the Federation of Analytical Chemistry and Spectroscopy Societies, Providence, Rhode Island, October 2002.
- Jarman, J. L. and J. A. de Haseth, "Continued Optimization and Characterization of a Glass Nebulizer CE/FT-IR Interface for Transmission Analyses," presented at the Federation of Analytical Chemistry and Spectroscopy Societies, Providence, Rhode Island, October, 2002.
- Seerley, S. I., J. L. Jarman, and J. A. de Haseth, "Semi-Automatic Sample Deposition for Micro ATR/FT-IR Spectrometry," to be presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March 2003.
- Jarman, J. L. and J. A. de Haseth, "FT-IR Spectrometric Detection in Capillary Electrophoretic Separations," to be presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March 2003.
- Thomas, A. G. A. and J. A. de Haseth, "ATR Infrared Composition Analysis of Intact Oligosaccharides," to be presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March 2003.
- Jarman, J. L. and J. A. de Haseth, "Application of FT-IR Spectrometric Detection in Capillary Electrophoretic Separations," presented at the 2004 Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, IL, March 8-11, 2004.

## **Professional Service**

### **Continuing Education**

#### **Co-Director: Society for Applied Spectroscopy Short Course on Fourier Transform Infrared Spectrometry.**

Presented: Philadelphia, PA, September 1982; Philadelphia, PA, September 1983; Pasadena, CA, October 1983; Philadelphia, PA, September 1984; Philadelphia, PA, September 1985; St. Louis, MO, September 1986; Atlantic City, NJ, March 1987; Irvine, CA, October 1987; New Orleans, LA, February 1988; Boston, MA, October 1988; Atlanta, GA, March 1989; Chicago, IL, September 1989; New York, NY, February 1990; Cleveland, OH, October 1990; Chicago, IL, March 1991; Anaheim, CA, October 1991; New Orleans, LA, March 1992; Philadelphia, PA, September 1992; Atlanta, GA, March 1993; Detroit, MI, October 1993; Chicago, IL, February 1994; St. Louis, MO, October 1994; New Orleans, LA, February 1995; Cincinnati, OH, October, 1995; Chicago, IL, March 1996; Kansas City, MO, September 1996; Nashville, TN, September 1999.

Independent presentations: The Perkin-Elmer Corporation, Ridgefield, CT; Standard Oil of Ohio, Cleveland, OH; Dow Chemical USA, Freeport, TX; PPG Industries, Pittsburgh, PA; Alcoa, Pittsburgh, PA; Colegio de Quimicos de Puerto Rico, San Juan, PR.

#### **Co-Director: Pittsburgh Conference Shortcourse on Advanced Fourier Transform Infrared Spectrometry.**

Presented: Atlanta, GA, March 1997; New Orleans, LA, March 1998.

#### **Co-Director: Pittsburgh Conference Shortcourse on Measuring and Enhancing the Performance of FT-IR Spectrometers.**

Presented: Orlando, FL, March 1999; New Orleans, LA, March 2000; New Orleans, LA, March 2001; New Orleans, LA, March 2002; Orlando, FL, March 2003; Chicago, IL, February 2004.

#### **Co-Director: Pittsburgh Conference Shortcourse on FT-IR Spectrometry of Surface Layers.**

Presented: Orlando, FL, March 1999 ; New Orleans, LA, March 2000; New Orleans, LA, March 2001; New Orleans, LA, March 2002 ; Orlando, FL, March 2003; Chicago, IL, February 2004; Orlando, FL, March 2005; to be presented Orlando, FL, March 2006.



**Instructor: 1st Euro-American Intensive Shortcourse on Advanced Infrared and Raman Spectroscopy, Hungarian Academy of Sciences, Veszprém, Hungary, August 1995.**

**Organizer and Co-Director: Society for Applied Spectroscopy Workshop on Fourier Transform Infrared Spectrometry.**

Presented: Athens, GA, July 1985; Athens, GA, July 1986; Athens, GA, June 1987; Athens, GA, July 1988.

**Bowdoin College Infrared Spectroscopy Shortcourses and Workshops.**

Presented at Bowdoin College, Brunswick, ME: July 1989; July 1990; July 1991; July 1992; July 1993; July 1994; July 1995; July 1996; July 1997; July 1998; July 1999; July 2001; July 2002; July 2003; July 2004; July 2005.  
To be presented: July 2006.

Independent presentations: Aspenäs (Lerum), Sweden, May 1990; Aspenäs (Lerum), Sweden, June 1993; Aspenäs (Lerum), Sweden, May 1996; University of Warwick (Coventry), U.K., May, 1997; Stenungsund, Sweden, May 2002; .  
To be presented: Sweden, May 2005.

## **Offices in Professional Societies**

### **Coblentz Society**

Membership Committee (Chairman) 1982 - 1997.

Committee on Spectral Digitization 1985 - 1987.

Board of Managers 1985 - 1989.

Ellis Lippincott Award Selection Committee, sponsored by the Society for Applied Spectroscopy, the Coblentz Society and the Optical Society of America (Member 1983 - 1984, as a Coblentz Society representative).

### **Society for Applied Spectroscopy**

Meggers Award Committee, sponsored by the Society for Applied Spectroscopy (Chairman-Elect 1985, Chairman 1986).

Membership Education Committee (Member 1987 - 1989, Chairman 1988).

Ellis Lippincott Award Selection Committee, sponsored by the Society for Applied Spectroscopy, the Coblentz Society and the Optical Society of America (Member 1987, Chairman 1988, for the Society for Applied Spectroscopy).

Membership Education Coordinator (Coordinator Elect 1992, Coordinator 1993-1996, member 1997).

Executive Committee, 1993-1994.

President-Elect 2006, President 2007, Past-President 2008.

#### **International Conferences**

Secretary, Symposium on the Analytical Chemistry of Pollutants, 1985 - present.

11th International Conference on Fourier Transform Spectroscopy (ICOFTS), August 1997, at Athens, GA. General Chairman.

International Conference on Fourier Transform Spectroscopy (ICOFTS), International Steering Committee (Member 1995-2003, Chair 2001-2003).

General Chairman for the 25th International Symposium on Environmental Analytical Chemistry, Jekyll Island, Georgia, June 19 through 21, 1995.

General Chairman for the 27th International Symposium on Environmental Analytical Chemistry, Jekyll Island, Georgia, June 15 through 19, 1997.

General Chairman for the 29th International Symposium on Environmental Analytical Chemistry, Jekyll Island, Georgia, May 23 through 27, 1999.

#### **Service in Professional Societies**

GC-IR Sub-Committee of the Coblentz Society Evaluation Committee 1976 - 1979.

Analytical Program Chairman: 34th Southeastern Regional Meeting of the American Chemical Society, Birmingham, Alabama, November 1982.

Conference Organizer and General Chairman - Southeastern Association of Analytical Chemists (SEAAC) Meeting, Athens, Georgia, April 1985.

Session Organizer and Chairman - Eastern Analytical Symposium, New York, New York, November 1984.

Session Organizer and Chairman - Eastern Analytical Symposium, New York, New York, November 1985.

Session Organizer and Chairman - Eastern Analytical Symposium, New York, New York, October 1988.

Session Organizer and Chairman - 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.

Award Symposium Organizer and Chairman - Ellis R. Lippincott Award Symposium presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.

Session Organizer and Chairman - 17th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Cleveland, Ohio, October, 1990.

Vibrational Spectroscopy Session Organizer - 18th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Anaheim, California, October 6-11, 1991.

Session Organizer and Chairman, Applications of Infrared Fibers to Mid- and Near-IR Spectroscopy - 21st Federation of Analytical Chemistry and Spectroscopy Societies Meeting, St. Louis, Missouri, October 1994.



De HASETH DECLARATION II

### DECLARATION UNDER 37 CFR 1.132

1. James A. de Haseth, hereby declare as follows:

1. I am making this declaration to supplement a declaration that I previously made and which I understand has been filed in U.S. Patent application 09/977,664 of Robert Herpst (hereinafter the "Herpst application") and I reassert all of the statements and opinions I expressed in that prior declaration.

2. In my professional career, I have become very familiar with all of the types of sample holding devices and accessories used in infrared spectroscopy, and none of those sample holding devices has ever included a sample holding substrate of the type defined in the claims of the Herpst application.

3. In my experience all of the crystal or glass infrared light transmitting windows and sample supporting substrates used as sample holders in a spectrophotometer have used infrared light transmitting substrates formed by precision optical polishing or vapor deposition.

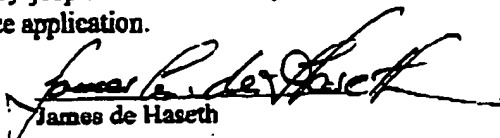
4. My opinion in my prior declaration filed in the Herpst application is based upon this experience.

5. I also based my opinions on the fact that the invention described in the claims of the Herpst application offers a low cost disposable sample substrate that is easy to use. In contrast to existing sample cards described in the 3M patents, which I understand to be U.S. Patent 5,470,757 and U.S. Patent 5,764,355, the card using a crystal optic substrate prepared in the manner set forth in the claims of the Herpst application do not have any material absorbances that would interfere with spectroscopic analysis and in contrast to other sample holding devices they are much more inexpensive and also disposable.

6. Except for polymer base cards of the type disclosed in the aforementioned 3M patents, prior art sample holders used in infrared spectroscopy are generally too expensive to be disposable, and the polymer cards of the 3M patent exhibit strong absorbances in the spectral range of interest to infrared spectroscopists and can complicate spectral analyses.

I hereby declare that all statements made herein of my own knowledge are true and correct and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false testaments and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. Section 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued under the above reference application.

Date: Feb 23, 2006

  
James de Haseth



# The University of Georgia

Department of Chemistry



## DECLARATION UNDER 37 CFR 1.132

I, Dr. James A. de Haseth, hereby declare as follows:

1. I am a Professor of Chemistry in the Department of Chemistry at the University of Georgia, Athens, Georgia and the co-author with Dr. Peter Griffiths of the textbook "Fourier Transform Infrared Spectrometry", Second Edition, Wiley-Interscience, New York, 2007. I have an extensive background in the field of spectroscopy and my curriculum vita is attached hereto setting forth my qualifications and background in that field.

2. Based upon my extensive experience in the field of spectroscopy, I offer the following background:

a. Prior to the 1980's, it was common to prepare liquid and mull samples as thin films between highly polished alkali halide windows. This was a most satisfactory method when highly polished windows could be obtained at a relatively low price. Unpolished opaque alkali halide windows, known as "blanks" were available to spectroscopists at a cost that was considerably lower than the cost of highly polished windows. Blanks, which were sold in unpolished form, were unsuitable for spectroscopic analysis unless and until they were polished. It was also common for practicing spectroscopists to know how to polish alkali halide windows. This is a time consuming process and it is a skill that has almost been totally lost to the average spectroscopy lab.

b. With the dominance of rapid data collection FT-IR spectrometers sample preparation became the rate limiting step in spectral measurement. By the 1980's data collection time had become shorter than sample preparation time and spectroscopists, or their lab managers, began to look for ways to reduce preparation and increase efficiency. As unpolished blank alkali halide windows were no longer being polished in the laboratory, the cost of analyses with these windows started to become prohibitively expensive as they had to be purchased from optic vendors in highly polished form at a considerable premium to the price of a "blank". Alternatives to alkali halide windows were sought.

c. Several vendors developed different media for transmission spectrometry of relatively non-volatile liquids, gels and pastes. The first of these devices were cards designed to fit into the sample compartment of a spectrometer, but they used a porous polymer as the sample substrate. I understand the polymer substrates to be described in the 3M patents, which I understand to be U.S. Patent 5,470,757 and U.S. Patent

5,764,355. The two most common substrates are polytetrafluoroethylene (PTFE) and polyethylene (PE). PE has strong absorption bands in the C-H stretching, bending, and rocking regions of the spectrum and these bands obfuscate, or at the least, distort, the spectrum in those regions. PTFE on the other hand has a series of strong bands in the fingerprint region, that is, below  $1500\text{ cm}^{-1}$ . Both substrates obscure important parts of the spectrum and to collect a spectrum without interferences, spectra on both substrates have to be run and then merged together to obtain a good spectrum. This is by no means an easy task.

d. The other common substrate is a mesh, sometimes made of stainless steel or copper, but more likely made of a polymer. I understand the mesh to be described in U. S. Patent 5,453,252 of Truett and which method is referred to as usable to make a screen in 5,764,355 of Gagnon et al. The mesh resembles mosquito screening. Although metal screens do not absorb IR radiation, they do reduce the intensity of the radiation through the sample compartment. In fact, most commercial vendors of FT-IR spectrometers use metal screen to attenuate the beam as these screens do not affect instrument linearity. Polymer screens are not used to attenuate the beam, as the grazing incident radiation over the screen "wires" is absorbed and a spectrum is produced. Most often the spectrum is distorted as sharp derivative bands result from grazing incidence radiation reflected off a polymer surface. In other words, the polymer screens add spectral distortions to the measurement, and all screens reduce the intensity of the radiation.

e. Both screens and polymer substrates have some sampling issues. The polymer substrates are rough, or pebbled, to prevent the production of interference fringes. The roughened surface leads to incomplete coverage of the polymer substrate. Typical deposits do not fill the beam and this leads to measurement artifacts. In addition, the deposits are not uniform in thickness, and this also leads to measurement artifacts. Sample thickness and coverage are an issue with screens. If the sample has sufficient viscosity or surface tension the sample will bridge the holes in the screen, but the thickness of the sample will tend to be greater near the supports and thin in the center. If the viscosity is low, the film will break between the supports and voids will be present in the sample. When voids or incomplete sample coverage takes place the photometric equivalent of "stray light" occurs. In an FT-IR spectrometer this has the effect that the transmittance of peaks will reach a limiting value. Conversely, the absorbance will reach a maximum and the peaks will be distorted. Other bands can reach their appropriate absorbances so the entire spectrum will be distorted in relative band height. This makes identification and interpretation very difficult. It also reduces the chances of identification by search systems as all modern search systems rely upon relative peak height. Non-uniform sample thickness further exacerbates the distortions beyond what is seen with sample voids or incomplete beam coverage.

f. Cleaved or chipped alkali halide windows do not suffer from these problems. The windows have no absorbances to obscure the spectra, and the surfaces are not so rough to prevent uniform coverage by the sample. In other words, the cleaved or chipped windows return the spectroscopist to the most advantageous situation as was

common more than twenty-five years ago. The advantage of the new windows is that can be prepared inexpensively and rapidly.

3. I have read and studied U.S. Patent application 09/977,664 of Robert D. Herpst and I am therefore familiar with the content of that application (hereinafter the "Herpst Application").

4. I have reviewed and understand all of the claims of the Herpst Application including the revised claims attached hereto.

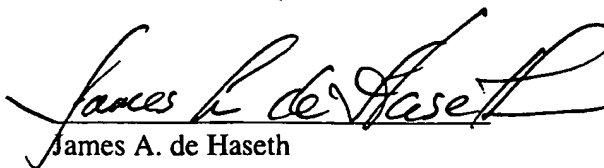
5. As to claim 1 of the attached revised claims, I understand that a finished product, a sample holder, is claimed for use with an infrared spectrophotometer that has an aperture formed therein and an infrared light transmitting crystal sample supporting substrate located in that aperture that allows the infrared light to pass through the crystal sample supporting substrate and no other material is present in that aperture that would substantially absorb the infrared light and where the crystal sample supporting substrate is formed by one or more of the steps of cleaving, fly cutting, chipping, milling or scaling. While the polymer and screen cards previously discussed are porous, and must be porous, a crystal processed in accordance with claim 1 language is not porous.

6. Use in a spectroscopic sampling device of an optic formed merely by cleaving, fly cutting, chipping milling or scaling is therefore an unexpected result to those skilled in the art because an optic formed by cleaving, fly cutting, chipping, milling or scaling is not first formed as a blank and is not formed by precision optical polishing, yet the optic transmits sufficient light energy for spectroscopic applications. It is my opinion that it would be unexpected for one skilled in the art of spectroscopy to be able to construct a finished product in the form of a sample holder for an infrared spectrophotometer or infrared filterometer in accordance with the steps and recited features of that claim and that familiarity with the previously discussed prior art relating to sampling substrates made from polymers, screens and crystal blanks (whether polished or unpolished) would not lead one skilled in the art to produce a usable substrate for a sample card in accordance with the recited features of that claim.

7. In my opinion, the same is true of the attached claim 18 that is a method for the manufacture of a sample holder for use in an infrared spectrophotometer or infrared filterometer, and, again, a final product sample holder is achieved in a manner that is unexpected to me and I believe to those skilled in the art of spectroscopy.

8. Since the same limitation or descriptions that I consider to result in the unexpected result discussed above are also present in later independent claims 30, 39, 45, 46, 47 and 53 attached hereto, it is my opinion that those claims describe an invention that achieves unexpected results.

I hereby declare that all statements made herein of my own knowledge are true and correct and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application of any patent issued under the above referenced application.



James A. de Haseth  
Professor of Chemistry



Revised claims – U.S. patent application 09/977,664

1. A sample holder for use with an infrared spectrophotometer or infrared filterometer that analyzes a sample through which infrared light is transmitted comprising a mounting means comprised of a first material having an aperture formed therein, an infrared light transmitting crystal sample supporting substrate being present in the aperture comprised of a second material allowing infrared light to pass therethrough without the infrared light transmitting crystal sample supporting substrate or any other material within the aperture substantially absorbing infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting sample supporting substrate being formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling.

2. The sample holder as defined in claim 1 wherein the infrared light transmitting crystal sample supporting substrate is mounted in the holder such that the perimeter of the aperture frames all or a centrally located part of said infrared light transmitting crystal sample supporting substrate to form an unimpeded path for infrared light to pass through the infrared light transmitting sample supporting substrate.

Claims 3-9. (canceled)

10. The sample holder as defined in claim 1 wherein said infrared light transmitting crystal sample supporting substrate is an alkali halide crystal.

11. The sample holder as defined in claim 1 wherein said infrared light transmitting crystal sample supporting substrate is an alkali halide crystal selected from the group consisting of KBr, NaCl and KCl.

12-14. (canceled)

15. The sample holder as defined in claim 2 further having an infrared light transmitting cover slide window formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling.

16. The sample holder as defined in claim 15 wherein a spacer is located between said infrared light transmitting crystal sample supporting substrate and said infrared light transmitting cover slide window to create a predetermined space therebetween.

17. The sample holder as defined in claim 15 wherein said infrared light transmitting cover slide window is affixed to said infrared light transmitting crystal sample supporting substrate by a clamping means.

18. A method for the manufacture of a sample holder for use in an infrared spectrophotometer or infrared filterometer, said method comprising the steps of:

providing a mounting means comprised of a first material having an aperture therethrough;

providing an infrared light transmitting crystal material,

forming an infrared light transmitting crystal sample supporting substrate of a second material having infrared light transmissive properties such that the substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling, or scaling material from said infrared light transmitting crystal material to form an infrared light transmitting crystal sample supporting substrate that allows the passage of infrared light therethrough;

positioning the infrared light transmitting crystal sample supporting substrate within the aperture so as to allow infrared light to pass through the aperture and the infrared light transmitting crystal sample supporting substrate and with no other material within the aperture that absorbs infrared light.

19. A method for the manufacture of a sample holder as defined in claim 18 wherein said step of providing a mounting means having an aperture comprises providing a disposable card or demountable card.

20. A method for the manufacture of a sample holder as defined in claim 18 further including the step of:

mounting the infrared light transmitting crystal sample supporting substrate to the holder in a position wherein all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of said aperture.

Claims 21-27. (canceled)

28. A method for the manufacture of a sample holder as defined in claim 18 further including the step of affixing an infrared light transmitting cover slide window to the infrared light transmitting crystal sample supporting substrate to provide a means of sandwiching a sample between said infrared light transmitting cover slide window and said infrared light transmitting crystal sample supporting substrate.

29. (canceled)

30. A method for using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of a first material having infrared light transmissive properties such that the infrared light transmitting crystal substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling, or scaling the infrared light transmitting crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a second material having at least one aperture adapted to fit within the spectrophotometer or filterometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting crystal sample supporting substrate in the path of the infrared light emitted by an infrared spectrophotometer or filterometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position where all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a sample to be analyzed onto the infrared light transmitting crystal sample supporting substrate,

inserting the holder into the spectrophotometer or filterometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light through the sample, the infrared light transmitting crystal sample supporting substrate and the aperture and no other material within said aperture other than the sample that absorbs infrared light.

31. A method as defined in claim 30 wherein said step of providing a mounting means comprises providing a card made of a disposable material.

32. A method as defined in claim 31 wherein said step of providing an infrared light transmitting material comprises providing an alkali halide crystal material.

33. A method as defined in claim 32 wherein said step of providing an infrared light transmitting material comprises providing a material selected from the group consisting of KBr, NaCl and KCl

34. (canceled)

35. A method as defined in claim 31 wherein said step of providing a mounting means further comprises the step of affixing an infrared light transmitting cover slide window to the infrared light transmitting crystal sample supporting substrate to form a means of

sandwiching a sample between said infrared light transmitting cover slide window and said infrared light transmitting crystal sample supporting substrate, said infrared light transmitting cover slide window being formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling without precision optical polishing of the infrared light transmitting cover slide window.

36. A method as defined in claim 35 wherein said step of placing a sample to be analyzed comprises sandwiching the sample between the infrared light transmitting cover slide window and the infrared light transmitting crystal sample supporting.

37. A method as defined in claim 36 wherein said step placing a sample to be analyzed comprises placing a bacterial colony between said infrared light transmitting cover slide window and said infrared light transmitting crystal sample supporting substrate.

38. (canceled)

39. A method for using a sample holder for use in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing a mounting means comprised of a first material having a plurality of apertures adapted to fit within said infrared spectrophotometer or infrared filterometer, said mounting means being formed so as to be capable of orienting the apertures in the path of the infrared light emitted by an infrared spectrophotometer or filterometer,

providing an infrared light transmitting material,

forming a plurality of infrared light transmitting crystal sample supporting substrates comprised of a second material having infrared light transmissive properties such that the substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling or scaling said infrared light transmitting crystal sample supporting substrates from said light transmitting material,

mounting one of said plurality of said infrared light transmitting crystal sample supporting substrates to the mounting means in a position wherein all or a centrally located part of one of said infrared light transmitting crystal sample supporting substrates is framed by the perimeter of at least one of the apertures,

placing a sample to be analyzed onto at least one of the infrared light transmitting crystal sample supporting substrates,

inserting the holder having the infrared light transmitting crystal sample supporting substrate mounted thereto into said infrared spectrophotometer or infrared filterometer between the infrared light source and the infrared light detector with at least one of the apertures aligned with the infrared light emitted by the infrared light source to allow the passage of a beam of infrared light through one or more samples, said infrared light transmitting crystal sample supporting substrates and apertures and no other material other than the sample within said aperture that absorbs infrared light.

40. A method for using a sample holder as defined in claim 39 wherein said step of forming a plurality of apertures and infrared light transmitting crystal sample supporting substrates mounted thereon comprises forming the plurality of apertures and infrared light transmitting sample supporting substrates in a carousel configuration.

41. A method for using a sample holder as defined in claim 40 wherein said step of placing a sample to be analyzed comprises placing a plurality of samples onto said plurality of infrared light transmitting crystal sample supporting substrates and said infrared spectrophotometer or infrared filterometer passes infrared light sequentially through said plurality of samples, said infrared light transmitting crystal sample supporting substrates and said apertures and no other material within said apertures that absorbs infrared light.

42. A method for using a sample holder as defined in claim 40 wherein said step of placing a sample onto at least one of the infrared light transmitting crystal sample supporting substrates comprises placing a bacterial colony onto said at least one infrared light transmitting sample supporting substrate.

43. A method for using a sample holder as defined in claim 40 wherein said step of inserting the holder having the infrared light transmitting crystal sample supporting substrate mounted thereto into the infrared spectrophotometer or infrared filterometer comprises inserting the holder in a horizontal position within the infrared spectrophotometer or infrared filterometer and passing a beam of infrared light at least once through the sample, the infrared light transmitting crystal sample supporting substrates and the aperture.

44. A method for using a sample holder as defined in claim 43 wherein the beam of infrared light is passed at least once through the sample by means of reflection.

45. A method for using a sample holder for use in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing a plurality of mounting means comprised of a first material, each having at least one aperture, each of said mounting means being formed so as to be capable of orienting the at least one aperture in the path of the infrared light emitted by an infrared spectrophotometer or filterometer

providing an infrared light transmitting crystal material,

forming a plurality of infrared light transmitting crystal sample supporting substrates comprised of a second material having infrared light transmissive properties such that the infrared light transmitting substrates do not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrates formed by cleaving, fly cutting, chipping, milling, or scaling infrared light transmitting crystal sample supporting substrates from said infrared light transmitting crystal material,

mounting one of said plurality of infrared light transmitting crystal sample supporting substrates to each of said plurality of mounting means in a position wherein all or a centrally located part of said sample supporting mounting means is framed by the perimeter of an apertures,

providing a mechanical carousel adapted to fit into the infrared spectrophotometer or infrared filterometer,

mounting said plurality of mounting means onto the mechanical carousel,

placing a sample to be analyzed onto at least one of the infrared light transmitting crystal sample supporting substrates,

inserting the carousel into the infrared spectrophotometer or infrared filterometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light in a sequential manner through the plurality of infrared light transmitting crystal sample supporting substrates, said samples and said apertures and no other material other than the samples within said apertures that absorb infrared light.

46. A method for using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the infrared light transmitting crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the infrared spectrophotometer or infrared filterometer, said holder being formed so as to be capable of orienting the at least one aperture in the path of the infrared light emitted by an infrared spectrophotometer or filterometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position wherein all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

inserting the holder into the infrared spectrophotometer or infrared filterometer to allow the passage of a beam of infrared light through the infrared light transmitting crystal sample supporting substrate to obtain one or more background scans of the absorbance of the infrared light transmitting crystal sample supporting substrate,



placing a sample to be analyzed onto the infrared light transmitting crystal sample supporting substrate,

inserting the holder into the infrared spectrophotometer or infrared filtermeter between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light through the infrared light transmitting crystal sample supporting substrate and the sample located thereon and with no other material within said at least one aperture that absorbs infrared light to obtain a scan of the absorbance of the sample and the infrared light transmitting crystal sample supporting substrate, and,

using the one or more background scans to subtract the background absorbance of the infrared light transmitting crystal sample supporting substrate without the sample from the absorbance of the sample and the infrared light transmitting crystal sample supporting substrate.

47. A method for using a sample holder in an infrared spectrophotometer or infrared filtermeter having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the infrared light transmitting crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the infrared spectrophotometer or infrared filtermeter, said mounting means being formed so as to be capable of orienting the infrared light transmitting crystal sample supporting substrate in the path of the infrared light emitted by the infrared spectrophotometer or filtermeter,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position wherein all or a centrally located part of the infrared light

transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a medium onto the infrared light transmitting crystal sample supporting substrate with which a sample will be mixed,

inserting the holder into the infrared spectrophotometer or infrared filterometer to allow the passage of a beam of infrared light through the medium and the infrared light transmitting crystal sample supporting substrate to obtain one or more background scans of the infrared light transmitting crystal sample supporting substrate and the medium,

placing a sample to be analyzed mixed with the medium onto the infrared light transmitting crystal sample supporting substrate,

inserting the holder into the infrared spectrophotometer or infrared filterometer analytical instrument between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow infrared light through the infrared light transmitting crystal sample supporting substrate and the medium mixed with the sample and with no other material other than the sample within said at least one aperture that absorbs infrared light and,

using the one or more background scans to subtract the absorbances of the medium and the infrared light transmitting crystal sample supporting substrate from the absorbances of the medium, the infrared light transmitting crystal sample supporting substrate and the sample.

48. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing an alkali halide crystal powder on the infrared light transmitting crystal sample supporting substrate.

49. A method of using a sample holder as defined in claim 48 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing KBr powder on the infrared light transmitting crystal sample supporting substrate.

50. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing mineral oil on the infrared transmitting crystal sample supporting substrate.

51. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing a solvent on the infrared light transmitting crystal sample supporting substrate.

52. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing a mixture of KBr powder and a solvent or a mineral oil on the infrared light transmitting crystal sample supporting substrate.

53. A method for using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of second material having infrared light transmissive properties such that the infrared light transmitting crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the spectrophotometer or filterometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting crystal sample supporting substrate in the path of the infrared light emitted by an infrared spectrophotometer or filterometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position where all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a bacterial colony to be analyzed onto the infrared light transmitting crystal sample supporting substrate,

inserting the mounting means into the spectrophotometer or filterometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light through the bacterial colony, the infrared light transmitting crystal sample supporting substrate and the at least one aperture and with no other material other than the bacterial colony within said at least one aperture that absorbs infrared light.

## Curriculum Vitae

James Andries de Haseth  
Professor of Chemistry  
Department of Chemistry  
University of Georgia  
Athens, Georgia 30602-2556 U.S.A.

**Education:** Bachelor of Science in Chemistry (ACS degree), University of Illinois at Chicago, 1972.

Doctor of Philosophy in Analytical Chemistry, University of North Carolina at Chapel Hill, December 9, 1977. Research Director: Professor Thomas L. Isenhour. Dissertation: "Search and Differentiation Algorithms and Information Theory Applied to Chemical Spectroscopic and Biochemical Data."

### Academic Employment:

1978-1979	Postdoctoral Research Associate, University of Tennessee, Knoxville, in association with Professor Gleb Mamantov.
1979-1983	Assistant Professor of Chemistry, The University of Alabama, University (Tuscaloosa).
1983-1987	Assistant Professor of Chemistry, University of Georgia, Athens.
1987-1992	Associate Professor of Chemistry, University of Georgia, Athens
1992-present	Professor of Chemistry, University of Georgia, Athens

### Other Professional Employment:

1980 (summer)	Research Chemist, U. S. Environmental Protection Agency, Southeast Environmental Research Laboratory, Athens, Georgia.
2003- 2004	Academic leave; U. S. Department of Agriculture, Agricultural Research Service, Quality Assessment Research Unit, Athens, Georgia.

## Research Areas

The major research focus is applications of Fourier transform infrared spectrometry, which includes the design of new spectrometers and interferometers. This research is being extended to the design of portable spectrometers for absorption and reflection in the UV through mid-IR regions, fluorescence, and Raman spectrometry. Data processing in the Fourier domain for chemical and spectrometric data and applications of information theory to chemical data are of interest. Research has also involved the interfacing of gas chromatography with FT-IR spectrometry for the development of analysis tools for the computerized identification of GC/FT-IR eluates. Liquid chromatographic interfaces for FT-IR spectrometry to record on-the-fly spectra of LC eluates have also been studied. The same technology has been used to study the dynamics of protein conformation. An additional interface between capillary electrophoresis and Fourier transform infrared spectrometry has been developed. The application of CE/FT-IR spectrometry is primarily for the study of complex carbohydrates. Vibrational Circular Dichroic studies with the use of FT-IR spectrometry have been pursued.

## Awards and Honors:

1984-1985	Council for Chemical Research Awardee.
1987	Tour Speaker for the Society for Applied Spectroscopy.
August 1989	Lecture series on Fourier Transform Infrared Spectrometry, presented at the University of Utrecht, The Netherlands.
1989 & 1990	The Ellis R. Lippincott Memorial Lecturer, Bowdoin College, Bowdoin Infrared Course, Brunswick, Maine, July 21, 1989, and July 20, 1990.
April 1990	Lecture series on the Applications of Fourier Transform Infrared Spectrometry, presented at Helsinki, Finland, and Stockholm, Sweden.
1990	Society for Applied Spectroscopy Certificate of Merit for service to the Society.
May 1991	The Annual Chemistry Awards Day Lecturer, The University of Illinois at Chicago, Chicago, Illinois, May 30, 1991.
April 1992	A series of three lectures on Fourier Transform Infrared Spectrometry was presented at The University of Helsinki, Helsinki, Finland.
August 1992	A series of twenty-four lectures was presented on Fourier Transform Infrared Spectrometry. The lectures were presented at Auckland and Wellington in New Zealand, and at Sydney, Brisbane, Perth, Adelaide, Hobart and Melbourne in Australia.
July 1995	Richard C. Lord Lecturer of the Coblentz Society, 1995.
February 2000	A series of ten hours of lectures on chromatography and vibrational spectrometry was given to the Minnesota Chromatography Forum, Minneapolis, Minnesota.
March 2000	A series of seven hours of lectures on FT-IR spectrometry was given to the Pittsburgh Spectroscopy Society

- 2001                      University of Georgia Chemistry Professor of the Year, awarded by the American Chemical Society Student Affiliates.
- November 2002        National Academies of Sciences, National Research Council Committee on Testing and Evaluation of Standoff Chemical Detectors.
- July 2004                Richard C. Lord Lecturer of the Coblenz Society, 2004.
- July 2004                Certificate of Appreciation for Outstanding Contributions to the USDA, awarded by the United States Department of Agriculture.
- April 2005              Northeast Georgia Section of the American Chemical Society Research Chemist of the Year, 2004-2005.

#### Scholarly Activities

#### Publications

##### Books authored or co-authored

Griffiths, P. R. and J. A. de Haseth, *Fourier Transform Infrared Spectrometry*, Wiley-Interscience, New York (1986), 656 pages.

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#### Book Reviews:

- Mamantov, G. and J. A. de Haseth, review of *Fourier Transform Infrared Spectroscopy: Applications to Chemical Systems*, Vol. 1, J. R. Ferraro and L. H. Basile, Eds., Academic Press, New York (1978), *Analytical Chemistry*, **51**, 83A (1979).
- de Haseth, J. A., review of *HRGC-FTIR: Capillary Gas Chromatography-Fourier Transform Infrared Spectroscopy*, by Werner Herres, Dr. Alfred Hüthig Verlag, Heidelberg (1987), *Journal of Chromatography*.

- de Haseth, J. A., review of *Infrared Spectroscopy: Analytical Chemistry by Open Learning*, by W. O. George and P. S. McIntyre, John Wiley & Sons, Chichester (1987), *Journal of the American Chemical Society*, **110**, 5238 (1988).
- de Haseth, J. A., review of *Laboratory Methods in Vibrational Spectroscopy*, 3rd ed., by H. A. Willis, J. H. van der Maas, and R. G. J. Miller, Eds., John Wiley & Sons, Chichester (1987), *Analytical Chemistry*, **61**, 308A (1989).
- de Haseth, J. A., review of *Chromatography/Fourier Transform Infrared Spectroscopy and Its Applications*, by R. White, Marcel Dekker, New York (1990), *Analytical Chemistry*, **62**, 1060A-1061A (1990).
- de Haseth, J. A., review of *Chromatography/Fourier Transform Infrared Spectroscopy and Its Applications*, by R. White, Marcel Dekker, New York (1990), *Applied Spectroscopy*, **45**(2), 20A (1991).

#### Other Publications

##### Editorial

- de Haseth, J. A., "Defining Our Terms", *Applied Spectroscopy*, **42**, 12A (1988).

##### Perspective

- de Haseth, J. A., "What is Analytical Chemistry?", *Spectroscopy International*, **1**(7), 22- 24 (1989), and *Spectroscopy*, **5**(1), 20-21 (1990).

#### Patents

- "Monodisperse Aerosol Generation Interface for LC/FT-IR Spectrometry", (joint with R. F. Browner, GIT). US Patent Number 4,924,097. Technology was licensed to Hewlett-Packard and Perkin-Elmer.
- "Monodisperse Aerosol Generation Interface for LC/FT-IR Spectrometry", (joint with R. F. Browner, GIT). European Community Patent Number 90201174.1-2303.
- "Monodisperse Aerosol Generation Interface for LC/FT-IR Spectrometry", (joint with R. F. Browner, GIT). Canadian and Japanese patents applied for, Japanese patent awarded.
- "Monodisperse Aerosol Generator for Use with Infrared Spectrometry", (joint with R. F. Browner, GIT). US Patent Number 5,175,433.
- "Monodisperse Aerosol Generator for Use with Infrared Spectrometry", (joint with R. F. Browner, GIT). European Community Patent Number 0455892A1.

**Seminars presented at other institutions**

- "Information Theory Applied to Protein Conformation", Emory University, Atlanta, Georgia, January 1980.
- "Fourier Domain Processing in FT-IR", University of Alabama in Birmingham, Birmingham, Alabama, April 1980.
- "Fourier Transform Infrared Spectrometry: Fourier Domain Studies", Middle Tennessee State University, Murfreesboro, Tennessee, October 1982.
- "Spectrometric Investigations in the Fourier Domain", Georgia Institute of Technology, Atlanta, Georgia, February 1983.
- "Fourier Transform Infrared Spectrometry", USDA, Athens, Georgia, January 1984.
- "Fractals in Spectrometry", University of New Orleans, New Orleans, Louisiana, March 30, 1984.
- "GC/FT-IR with Wide Bore Capillary Columns", Digilab Users' Group Meeting, Cambridge, Massachusetts, June 20, 1984.
- "Wide Bore Capillary GC/FT-IR", USEPA, Las Vegas, Nevada, August 2, 1984.
- "Gas Chromatography/Fourier Transform Infrared Spectrometric Information", Procter and Gamble Company, Cincinnati, Ohio, January 24, 1985.
- "Gas and Liquid Chromatography/Fourier Transform Infrared Spectrometry", Burroughs Wellcome Company, Greenville, North Carolina, September 13, 1985.
- "Infrared Structure Elucidation in the Fourier Domain", East Carolina University, Greenville, North Carolina, September 13, 1985.
- "Time Resolved Infrared Spectrometry and Fourier Domain Structure Elucidation", Exxon Research and Engineering Company, Annandale, New Jersey, October 2, 1985.
- "Countercurrent Chromatography/Fourier Transform Infrared (CCC/FT-IR) Spectrometry", Digilab Users' Group Meeting, Cambridge, Massachusetts, June 24, 1986.
- "A Window Fourier Domain Infrared Search System", Standard Oil of Ohio, Cleveland, Ohio, September 17, 1986.
- "Infrared Spectra of Liquid Chromatographic Eluates: The Countercurrent Approach", presented at James Madison University, Harrisonburg, Virginia, November 21, 1986.
- "Spectral Identification in the Fourier Domain", presented at the University of Delaware, Newark, Delaware, February 20, 1987.
- "MAGIC-LC/FT-IR Spectrometry", presented at the University of South Florida, Tampa, Florida, October 8, 1987.



- "MAGIC-LC/FT-IR Spectrometry", presented at the University of Miami, Coral Gables, Florida, October 9, 1987.
- "Vibrational Circular Dichroism FT-IR Spectrometry", presented at the University of Alabama at Birmingham, Birmingham, Alabama, January 29, 1988.
- "MAGIC-LC/FT-IR Spectrometry", presented at the Spectroscopy Society of Pittsburgh, April 20, 1988.
- "MAGIC-LC/FT-IR Spectrometry", presented at the Digilab User's Meeting, Cambridge, Massachusetts, June 21, 1988.
- "Liquid Chromatography and Fourier Transform Infrared Spectrometry", presented at Bruker Analytische Messtechnik, Karlsruhe, Germany, December 9, 1988.
- "An Introduction to Fourier Transform Infrared Spectrometry", presented at the Perkin-Elmer User's Meeting, Stockholm, Sweden, December 14, 1988.
- "State-of-the-Art in GC/FT-IR Spectrometry", presented at the Perkin-Elmer User's Meeting, Stockholm, Sweden, December 14, 1988.
- "Infrared Fibers and Their Use in the Analysis of Polyurethane Flexible Foams", presented at Dow Chemical USA, Freeport, Texas, August 28, 1990.
- "The Use of Mid-Infrared Fibers as Remote Probes", presented at the Institute of Paper Science and Technology, Atlanta, Georgia, November 9, 1990.
- "Mid-Infrared Fibers as Remote Probes", presented at Los Alamos National Laboratories, Albuquerque, New Mexico, December 20, 1990.
- "Mid-Infrared Fibers and their Use in the Analysis of Polymers", presented at the Department of Chemistry, University of New Mexico, Albuquerque, New Mexico, February 27, 1991.
- "Mid-Infrared Fibers for Remote Sensing", presented at the Bio-Rad FT-IR Users' Meeting, Cambridge, Massachusetts, June 27, 1991.
- "Monitoring of Polyurethanes with Mid-Infrared Fibers", presented at the Institut für Physikalische Chemie der Universität zu Köln, Cologne, Germany, September 11, 1991.
- "Mid-Infrared Fibers for the Analysis of Polyurethane Foams and RIM Polyurethanes", presented at Dow Chemical USA, Freeport, Texas, September 23, 1991.
- "Mid-Infrared Probes", presented for the Analytical Science Discussion Group, Dow Chemical Company, Midland, Michigan, December 9, 1991.
- "Mid-Infrared Fiber Probes," presented at the Bio-Rad Users' Meeting (Europe), Dusseldorf, Germany, April 28, 1992.

"Mid-infrared Fiber Probes", presented at the Society for Applied Spectroscopy Local Meeting, Chicago, Illinois, May 12, 1992.

"Applications of Analytical FT-IR Spectrometry: Infrared Fiber Probes and HPLC/FT-IR Spectrometry", presented at Shell Development Company, Houston, Texas, August 17, 1993.

"Applications of Analytical FT-IR Spectrometry: Infrared Fiber Probes and HPLC/FT-IR Spectrometry", presented at Clemson University, Clemson, South Carolina, September 30, 1993.

"Mid-IR Fiber Probes", presented at Aristech Chemical Corporation, Monroeville, Pennsylvania, November 17, 1993.

"Characterization of Protein Folding by Particle Beam FT-IR Spectrometry," presented at the Hercules Analytical Symposium, Hercules Corporation, Wilmington, Delaware, May, 1995.

"The Use of Step-Scanning in FT-IR Spectrometry," presented at the Eastman Chemical Company, Kingsport, TN, February, 1998.

"Process Monitoring with FT-IR Spectrometry," presented at the Eastman Chemical Company, Kingsport, TN, February, 1998.

"Fourier Transform Infrared Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.

"Quantitative Analysis with Fourier Transform Infrared Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.

"Chromatography and Infrared Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.

"Fourier Transform Near Infrared Raman Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.

"Process Monitoring with FT-IR Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.

"System Problems and Potential Errors with Fourier Transform Infrared Spectrometry," presented at The Dow Chemical Company, Freeport, TX, October, 1998.

"Protein Conformation by Particle-Beam Infrared Spectrometry," presented at Waseda University, Tokyo, Japan, November, 1998.

"The Determination of Carbohydrate Composition by FT-IR Spectrometry," presented at Kwansei-Gakuin University, Nishinomiya, Japan, November, 1998.

"Quantitative Analysis of Complex Carbohydrates by FT-IR Microspectrometry," presented at a joint meeting of the Minnesota Section of the American Chemical Society and the Minnesota Local Section of the Society for Applied Spectroscopy, Minneapolis, Minnesota, February, 2000.

"Capillary Electrophoresis/FT-IR Spectrometry," presented at Air Products Corporation, Incorporated, Allentown, Pennsylvania, July, 2000.

"Analysis of Complex Carbohydrates by FT-IR Spectrometry and Chemometrics," presented at the University of Idaho, Moscow, Idaho, January 23, 2001.

"Capillary Electrophoresis/Fourier Transform Infrared Spectrometry for Carbohydrate Analysis," presented at the Complex Carbohydrate Research Center, University of Georgia, Athens, Georgia, February 28, 2001.

"FT-IR Instrumentation for the Process Control Industry," presented at Mettler Toledo AutoChem, Millersville, MD, January 2003.

"Process Control with Raman Spectrometry," presented at Mettler Toledo AutoChem, Millersville, MD, January 2003.

#### **Supervision of Student Research**

##### **Dissertations Directed**

Denys François Leclerc      University of Georgia    1985  
"Fractal Phenomena in FT-IR Data Processing"  
Current Employment: Pulp and Paper Research Institute of Canada, Vancouver, BC.

Paul Thomas Richardson      University of Georgia    1985  
"Fourier Transform Infrared Spectrometry: Environmental Problem Solving by Computer ized Techniques"  
Current Employment: E. I. DuPont de Nemours and Co., Wilmington, DE.

Rodolfo Jesus Romaniach      University of Georgia    1986  
"Development of CCC/FT-IR Spectrometry"  
Current Employment: Associate Professor, University of Puerto Rico, Mayaguez, PR.

Ellen Victoria Nagy      University of Georgia    1988  
"The Use of Information Theory in the Prediction of Protein Secondary Structures"  
Current Employment: Georgia Pacific, Decatur, GA.

Colleen Ann McCoy      University of Georgia    1988  
"Advances in Phase Correction and Measurement of Vibrational Circular Dichroism by Double Modulation Fourier Transform Infrared Spectrometry"  
Current Employment: unknown. Left Georgia Pacific for medical school.

Miron Gerard Still      University of Georgia    1989  
"Theoretical Studies of Chiral Stationary Phases"  
Current Employment: Whitehall Robbins, Richmond, VA.

Raymond Marion Robertson      University of Georgia    1989

"Monodisperse Aerosol Generator Interface Combining Liquid Chromatography with Fourier Transform Infrared Spectrometry"

Current Employment: Hoechst Celanese, Charlotte, NC.

Jeffrey William Sherman      University of Georgia    1990

"Studies in Search and Classification Systems Using Window Fourier Domain Data"

Current Employment: Mettler-Toledo, Newark, DE.

Xu-Jin Lü      University of Georgia    1991

"Studies of Enantioselective Interactions in Chiral Separations by Fourier Transform Infrared Spectrometry"

Current Employment: Bristol-Myers Squibb, Brunswick, NJ.

Jennifer Elizabeth Andrews      University of Georgia 1991

"Mid-Infrared Fiber-Fourier Transform Infrared Spectrometry"

Current Employment: Mettler-Toledo AutoChem, Atlanta, GA.

Glenda Kay Ferguson      University of Georgia    1993

"Investigation of Pharmaceutical Analyses with Monodisperse Aerosol Generator Interface Combining Liquid Chromatography with Fourier Transform Infrared (MAGICLC/FT-IR) Spectrometry"

Current Employment: Associate Professor, Wesleyan College, Macon, GA.

Vincent Edward Turula, Jr.      University of Georgia    1995

"Dynamic Solution Conformation of Biopolymers by Particle Beam LC/FT-IR Spectrometry"

Current Employment: Wyeth Vaccines, Research Triangle Park, NC.

Xihui Liang      University of Georgia    1995

"Target Transformation Factor Analysis in the Study of Polyurethane Foam Formation and Curing and VCD/FT-IR Spectrometry in the Determination of Chiral Separation Mechanisms"

Current Employment: Pfizer, Inc., Groton, CT.

Sanmitra Arvind Bhat      University of Georgia    1996

"Study of Polyurethane Foams by Mid-Infrared Fiber/FT-IR Spectrometry and Study of Ester Crosslinking Reactions on Aluminum Surfaces by Infrared-ATR Spectrometry"

Current Employment: Eastman Chemical, Kingsport, TN.

Runhua Zhao      University of Georgia    1996

"FT-IR Spectrometry and Capillary Electrophoresis in the Study of Carbohydrates"

Current Employment: Johnson & Johnson, King of Prussia, PA.

Randall Todd Bishop      University of Georgia    1997

"Solution Conformation of Peptides and Proteins under Reversed-Phase Chromatography by Particle Beam LC/FT-IR Spectrometry"

Current Employment: Glaxo-Wellcome, Research Triangle Park, NC.

Richard Andrew Todebush      University of Georgia    2001

"FT-IR Detection System for Capillary Electrophoresis and a Novel Deposition method for ATR"

Current Employment: Kiel Laboratories, Gainesville, GA.

Richard Brian Melkowitz      University of Georgia    2002  
"The Analysis of Complex Carbohydrates by Fourier Transform Infrared Microspectrometry and Single-Bounce Attenuated Total Reflection Spectrometry"  
Current Employment: Noveon Plastics, Cleveland, OH.

Jessica Lea Jarman      University of Georgia    2003  
"Developments in Capillary Electrophoretic Instrumentation and FT-IR Spectrometric Detection, and Semi-Automated FT-IR Spectrometric Sample Deposition"  
Current Employment: GE Plastics, Mt. Vernon, IN

Andrew Gardner Adams Thomas      University of Georgia    2003  
"FT-IR Spectrometric Studies of Carbohydrates and Proteins"  
Current Employment: Gainesville College, Gainesville, GA.

#### **Theses Directed**

Kalam Abul Mir      University of Georgia    1985  
"Computerized Structure Elucidation in Infrared Spectrometry"  
Current Employment: Formerly employed by the Armed Forces Food & Drug Laboratory, Bangladesh, recently earned a Ph.D. at Queen's University, Kingston, Ontario, Canada

Cindy Robin Friedman      University of Georgia    1985  
"Gas Phase Rapid-Scanning Fourier Transform Infrared/Time-Resolved Spectrometry"  
Current Employment: Formerly employed by Spectra-Tech, Inc., Shelton, CT. Now marketing manager for a manufacturer of health equipment.

Hilda Velazquez      University of Georgia    1985  
"Very Wide-Bore Capillary Gas Chromatography"  
Current Employment: Universidad Nacional Experimental del Tachira, Venezuela

Maritza Ivonne Quiñones      University of Georgia    1986  
"Wide Bore Capillary Gas Chromatography/Fourier Transform Infrared Spectrometry"  
Current Employment: United States Department of Agriculture, Athens, GA.

Seldon Penn Weaver      University of Georgia    1986  
"Gas-Phase Rapid-Scanning Fourier Transform Infrared/Time-Resolved Spectrometry (FT-IR/TRS)"  
Current Employment: Amorphous Silicon, Inc. Moses Lake, WA.

Julie Lynne Hust      University of Georgia    1991  
"A Window Fourier Domain Structural Search System"  
Current Position: unknown. Received doctorate in Chemical Education at Ohio University; may be teaching at the high school level.

Joel Allen Caughran      University of Georgia    1994  
"Correlations Between the Mechanical Properties and Attenuated Total Reflectance Infrared Spectra of Polyurethane Foams"  
Current Employment: Department of Chemistry, University of Georgia, Athens, GA.

William Maddux McClarin, III University of Georgia 1995  
"Investigations of a Chiral Separation Mechanism Using Fourier Transform Infrared Spectrometry and Two-Dimensional Nuclear Magnetic Resonance Spectrometry"  
Current Employment: Thiele-Kaolin Corporation, Sandersville, GA.

Melissa Chanda Berry Medlin University of Georgia 1996  
"Analytical Evaluation of Dialkyl Phosphates as Indicators of Organophosphorus Pesticide Exposure"  
Current Employment: Kimberly Clarke Corporation, Doraville, GA.

Yu Cang University of Georgia 2000  
"Studies of Processed Cotton Fabrics and Dental restorative Resin Materials with the Use of Fourier Transform infrared Spectrometry"  
Current Employment: unknown. Pursued a graduate degree in Computer Science at the University of North Carolina at Charlotte.

Ushiri Kulatunga University of Georgia 2000  
"Separation of Monosaccharides Found in Glycoproteins by Capillary Electrophoresis" Current Employment: Instructor, Athens Technical College, Athens, GA.

Tracey Leigh Cash University of Georgia 2001  
"Applications of Capillary Electrophoretic Analysis"  
Current Employment: Eli Lilly and Company, Indianapolis, IN.

#### Postdoctoral Research Associates

Vincent E. Turula, Jr, 1995-1996  
Current Employment: Wyeth Vaccines, Research Triangle Park, NC.

Lin-Tao He, 1996-1997.  
Current Employment: Beijing Institute of Microchemistry, Beijing, China.

#### Editorial responsibilities

Associate Editor: *Applied Spectroscopy* (1982-1993)  
*Applied Spectroscopy Reviews* (1995 -2001)

Journal Referee: *American Chemical Society Audio Courses*  
*American Chemical Society Symposium Series*  
*American Society for Testing and Materials Special Publications*  
*Analytical Chemistry*  
*Applied Spectroscopy*  
*Biophysical Journal*  
*Chemometrics and Intelligent Laboratory Systems*  
*Energy & Fuels*

*Journal of Agricultural and Food Science*  
*Journal of the American Chemical Society*  
*Journal of Chemical Information and Computer Science*  
*Journal of Chromatography*  
*Journal of Chromatography A*  
*Journal of Computational Chemistry*  
*Journal of Environmental Monitoring*  
*Journal of High Resolution Chromatography and Chromatographic Communications*  
*Journal of Molecular Structure*  
*Journal of Molecular Structure*  
*Journal of Physical Chemistry*  
*LC/GC The Magazine of Separation Science*  
*Planta*  
*Science*  
*Spectrochimica Acta, Part B*  
*Spectroscopy*  
*Talanta*  
*The Analyst*

#### **Papers Presented at Scientific Meetings**

##### **Keynote Addresses**

- de Haseth, J. A., "New Trends in Biomedical FT-IR Spectrometry", presented at the Fifth International Symposium on New Spectroscopic Methods in Biomedical Research, Seattle, Washington, October 1986.
- de Haseth, J. A., "Vibrational Spectrometry: Abreast with New Technology," presented at the First Australian Conference on Vibrational Spectroscopy, Sydney, New South Wales, Australia, February, 1995.
- de Haseth, J. A., "Data Processing Pitfalls: Possible Problems with Spectral Data Processing and Sample Preparation," presented at the Third International Infrared Users' Group Meeting [of Art Conservationists and Art Preservationists], Winterthur, Delaware, May 28-30, 1998.

##### **Plenary**

- de Haseth, J. A., "Mathematics of Spectral Treatment in the Fourier Domain", presented at the 1985 International Conference on Fourier Transform and Computerized Infrared Spectroscopy, Ottawa, Ontario, Canada, June, 1985.
- de Haseth, J. A., "MAGIC, VCD and Other Improbable Techniques", presented at the Meeting of the Infrared and Raman Discussion Group of Great Britain, King's College, University of London, London, England, December 15, 1988.
- de Haseth, J. A., "Mid-Infrared Fibers and Probes," presented at the 10th International Conference on Fourier Transform Spectroscopy, Budapest, Hungary, August, 1995.

- de Haseth, J.A., V.E. Turula, R.T. Bishop, and R. Zhao, "LC and CE/FT-IR Spectrometry in Trace Analysis," presented at the 26th International Symposium on Environmental Analytical Chemistry, Vienna, Austria, April, 1996.
- de Haseth, J. A., "A Metal Nebulizer Capillary Electrophoresis/FT-IR Spectrometric Interface," Fifth International Symposium on Hyphenated Techniques in Chromatography and Hyphenated Chromatographic Analyzers, Bruges, Belgium, February, 2000.
- de Haseth, J. A., "Capillary Electrophoresis/FT-IR Spectrometry," 30th International Symposium on Environmental Analytical Chemistry, Espoo, Finland, August, 2000.

#### **Invited Presentations in Symposia**

- de Haseth, J. A., "Bibliographic Text Searching on a Minicomputer", presented at the American Society Workshop on Computers in Chemistry, Chicago, Illinois, August 1975.
- Isenhour, T. L., J. A. de Haseth, G. T. Rasmussen, and W. S. Woodward, "Visual Information Interpretation - A Low Cost Color Display System", presented at the Third Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, November 1976.
- de Haseth, J. A., and T. L. Isenhour, "An Information Theoretical Approach to the Determination of Secondary Structure in Globular Proteins", presented at the 173rd American Chemical Society National Meeting, New Orleans, Louisiana, March 1977.
- de Haseth, J. A., "An Interferogram-Based Search System for Vapor Phase Fourier Transform Data", presented at the Eighth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September 1981.
- de Haseth, J. A., and D. F. Leclerc, "Fractal Analysis Applied to Interferometric Searches", presented at the Ninth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September 1982.
- de Haseth, J. A., "Spectral Transformation: An Identification Tool", presented at the ASTM E13.03 Infrared Spectroscopy Symposium, "The Computer: Friend or Foe", Ninth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September 1982.
- de Haseth, J. A., "Fractal Analysis of Time Domain Data", presented at the 36th Annual Summer Symposium on Analytical Chemistry, "Fourier Transforms and Their Applications to Instrumental Analysis", Lincoln, Nebraska, June 1983.
- de Haseth, J. A., "Stroboscopic FT-IR Spectroscopy - Past, Present and Future", presented at the 36th Annual Summer Symposium on Analytical Chemistry, "Fourier Transforms and Their Applications to Instrumental Analysis", Lincoln, Nebraska, June 1983.
- de Haseth, J. A., S. P. Weaver, P. T. Richardson, and R. J. Románach, "Considerations on the Chromatography/Spectrometry Interface", presented at the 23rd Annual Eastern Analytical Symposium, New York, New York, November 14, 1984.



- de Haseth, J. A., D. F. Leclerc, and P. T. Richardson, "Fourier Transforms for Spectral Identification", presented at the 23rd Annual Eastern Analytical Symposium, New York, New York, November 15, 1984.
- de Haseth, J. A., and D. F. Leclerc, "Scaling Fractals in Spectrometry", presented at the 23rd Annual Eastern Analytical Symposium, New York, New York, November 15, 1984.
- de Haseth, J. A., "Fourier Domain Infrared Spectral Recognition", presented at the First Conference on Spectral Pattern Recognition, Aberdeen Proving Ground, Maryland, December 11, 1984.
- de Haseth, J. A., "Pesticide Analysis by GC and LC/FT-IR Spectrometry", presented at the 15th Annual Symposium on the Analytical Chemistry of Pollutants, Jekyll Island, Georgia, May 21, 1985.
- de Haseth, J. A., "Fractals: Discrete Mathematics for Optimization of Signal Versus Noise", presented at the Gordon Conference on Analytical Chemistry, New Hampton, New Hampshire, August 14, 1985.
- de Haseth, J. A. and R. J. Romaniach, "High Speed Countercurrent Chromatography/Fourier Transform Infrared Spectrometry", presented at the 24th Annual Eastern Analytical Symposium, New York, New York, November 21, 1985.
- de Haseth, J. A., "High Speed Countercurrent Chromatography/Fourier Transform Infrared Spectrometry", presented at the 39th Annual Summer Symposium on Analytical Chemistry, "Chromatographic/Spectroscopic Combinations", Salt Lake City, Utah, June 18, 1986.
- de Haseth, J. A., "Computer-Assisted Identification of Infrared Spectra", presented at the Third International Conference on Diffuse Reflectance Spectroscopy, Chambersburg, Pennsylvania, August 20, 1986.
- de Haseth, J. A. and R. J. Romaniach, "CCC/FT-IR Spectrometry", presented at the 13th Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, St. Louis, Missouri, October 3, 1986.
- de Haseth, J. A., "New Trends in FT-IR: An Overview", presented at the 25th Annual Eastern Analytical Symposium, New York, New York, October 23, 1986.
- de Haseth, J. A., "Fractals in FT-IR Spectrometry", presented at the Second Annual Scientific Computing and Automation Conference and Exposition, Atlantic City, New Jersey, November 7, 1986.
- de Haseth, J. A., "Introduction to Fourier Transform Infrared Spectrometry", presented at the 193rd American Chemical Society National Meeting, Denver Colorado, April 5, 1987.
- de Haseth, J. A., "Qualitative and Quantitative Analysis in the Fourier Domain", presented at the 193rd American Chemical Society National Meeting, Denver, Colorado, April 8, 1987.

- de Haseth, J. A. and C. A. McCoy, "Advances in VCD-FT-IR Spectrometry", presented at the Pacific Conference on Chemistry and Spectroscopy, Irvine, California, October 29, 1987.
- de Haseth, J. A., "Chemical Instrumentation Based upon the Fourier Transformation", presented at the Third Chemical Congress of North America, Toronto, Ontario, Canada, June 7, 1988.
- de Haseth, J. A., "MAGIC-LC/FT-IR Spectrometry", presented at the 18th International Symposium on Environmental Analytical Chemistry and the 4th International Congress on Analytical Techniques in Environmental Chemistry, Barcelona, Spain, September 5, 1988.
- de Haseth, J. A. and R. M. Robertson, "MAGIC-LC/FT-IR Spectrometry", presented at the Benedetti-Pichler Award Symposium Honoring Professor Richard F. Browner, 27th Eastern Analytical Symposium, New York, New York, October 6, 1988.
- de Haseth, J. A. and C. A. McCoy, "FT-IR Vibrational Circular Dichroism Spectrometry: Status and Applications", 27th Eastern Analytical Symposium, New York, New York, October 7, 1988.
- de Haseth, J. A., R. M. Robertson, and R. F. Browner, "MAGIC-LC/FT-IR Spectrometry", presented at the 15th Federation of Analytical and Spectroscopy Societies Meeting, Boston, Massachusetts, November 1, 1988.
- de Haseth, J. A., "Hyphenated Methods in Fourier Transform Infrared Spectrometry", presented at the Infrared and Raman Discussion Group of The Netherlands, The University of Utrecht, Holland, August 25, 1989.
- Browner, R. F. and J. A. de Haseth, "A Novel Interface for LC-Infrared Spectroscopy", presented at the International Symposium on Detection in Liquid Chromatography and Flow Injection Analysis (HPLC/FIA), Córdoba, Spain, September 21, 1989.
- de Haseth, J. A. and J. E. Andrews, "Fiber Optics Applications in the Mid-Infrared", presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.
- de Haseth, J. A., R. M. Robertson, and G. K. Ferguson, "A Practical Full Bandwidth Detector for Liquid Chromatography", presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.
- de Haseth, J. A. and R. F. Browner, "Development of a MAGIC Interface for HPLC/FT-IR", presented at the 13th Annual Conference on Analysis of Pollutants in the Environment, Norfolk, Virginia, May 9, 1990.
- de Haseth, J. A., "An Infrared Detection System for Liquid Chromatography", presented at the North Jersey Chromatography Meeting, Norwalk, Connecticut, June 8, 1990.
- de Haseth, J. A., "Infrared Spectrometry of Non-Traditional Samples", presented at the 11th Biennial Conference on Chemical Education, Atlanta, Georgia, August 7, 1990.

- Andrews, J. E. and J. A. de Haseth, "Kinetic Studies with the Use of Mid-Infrared Fibers", presented at 17th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Cleveland, Ohio, October 9, 1990.
- de Haseth, J. A., "Why FT-IR? An Overview", presented at the 35th Annual Meeting of the Biophysical Society, San Francisco, California, February 25, 1991.
- de Haseth, J. A. and J. E. Andrews, "Polyurethane Monitoring by Mid-Infrared Fiber Fourier Transform Spectrometry", presented at the 8th International Conference on Fourier Transform Spectroscopy, Lübeck-Travemünde, Germany, September 1-6, 1991.
- de Haseth, J. A., "Mid-infrared Fibers in Flexible Foams", presented at the Joint Meeting Federation of Analytical Chemistry and Spectroscopy Societies/Pacific Conference, Anaheim, California, October 6-11, 1991.
- de Haseth, J. A., R. D. Priester, Jr., J. V. McCluskey, and D. Cortelek, "Mid-Infrared Fiber Monitoring of RIM Polyurethanes", presented at the Joint Meeting Federation of Analytical Chemistry and Spectroscopy Societies/Pacific Conference, Anaheim, California, October 6- 11, 1991.
- de Haseth, J. A., "Mid-Infrared Fiber Probes," presented at the Società Chimica Italiana, Divisione di Chimica Analytica, Gargnano (Brescia), Italy, April 22-23, 1992.
- de Haseth, J. A., "Polymer Monitoring with Mid-IR Fibers", presented at the International Symposium on Optical Tools for Manufacturing and Advanced Automation, Boston, Massachusetts, September 7-10, 1993.
- de Haseth, J. A., "Historical Perspectives of FT-IR Analytical Techniques", presented at the International Symposium on Optical Sensing for Environmental Monitoring, Atlanta, Georgia, October 11-14, 1993.
- de Haseth, J. A., R. Zhao, S. A. Bhat, X. Liang, and R. A. Dluhy, "Mid- and Near-IR Fiber Probes," presented at the 21st Federation of Analytical Chemistry and Spectroscopy Societies Meeting, St. Louis, Missouri, October, 1994.
- de Haseth, J. A., "The Use of Mid-Infrared Fibers in Polymer Analysis," presented at the First Australian Conference on Vibrational Spectroscopy, Sydney, New South Wales, Australia, February, 1995.
- de Haseth, J. A., "Vibrational Circular Dichroism/Fourier Transform Infrared Spectrometry of the Mechanisms in Chiral Separations," presented at the First Australian Conference on Vibrational Spectroscopy, Sydney, New South Wales, Australia, February, 1995.
- de Haseth, J. A., "The Investigation of Protein Conformation with the Use of Particle Beam/Infrared Spectrometry," presented at the First Australian Conference on Vibrational Spectroscopy, Sydney, New South Wales, Australia, February, 1995.

- de Haseth, J. A., "Infrared Spectrometry in Pesticide Analysis at the Sub-Nanogram Level," presented at the Southeastern Meeting of the Association of Official Analytical Chemists, Atlanta, Georgia, February, 1995.
- de Haseth, J.A., X. Liang, and S.A. Bhat, "Mid-Infrared Fiber Probes as Reaction Monitors," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 1995.
- de Haseth, J.A., "Infrared Spectrometry in the Near and Immediate Future," presented at the Eastern Analytical Symposium, Somerset, New Jersey, November, 1995.
- de Haseth, J.A., "Characterization of Protein Folding by Particle Beam FT-IR Spectrometry," presented at the Eastern Analytical Symposium, Somerset, New Jersey, November, 1995.
- de Haseth, J.A., V.E. Turula, and R.T. Bishop, "Protein Conformation by Particle Beam Infrared Spectrometry," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March, 1996.
- de Haseth, J. A., "Measurement of Dynamic Protein Conformation by Particle Beam LC/FT-IR Spectrometry," presented at the Eastern Analytical Symposium, Somerset, New Jersey, November, 1997.
- de Haseth, J. A., "Capillary Electrophoresis/FT-IR Spectrometry," to be presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 1998.
- de Haseth, J. A., "Combination of Proteolytic Digest and Deuterium Labeling for the Determination of Protein Structure," to have been presented at the American Chemical Society National Meeting, Boston, Massachusetts, August 23-27, 1998. [Withdrew; death in family.]
- de Haseth, J. A., "Particle Beam LC/FT-IR and CE/FT-IR Spectrometry," presented at the Spectroscopy Society of Japan National Meeting, Osaka, Japan, November 19-20, 1998.
- de Haseth, J. A., "Hyphenated Techniques and FT-IR Spectrometry: What's Wrong?," invited for presentation at the Eastern Analytical Symposium, Somerset, New Jersey, November, 1998. [Declined: this symposium coincided with the lectures in Japan.]
- de Haseth, J. A., "Successive Average Orthogonalization and Iterative Target Transformation Factor Analysis," Lectures on Chemometrics, Waseda University, Tokyo, Japan, August 22, 1999.
- de Haseth, J. A., "The Drive for Ultimate Sensitivity: Interfaces Between Separations Technologies and FT-IR Spectrometry," presented in the Williams-Wright Award Symposium at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 2001.
- de Haseth, J. A., "Composition of Oligosaccharides with the Use of Chemometrics and Infrared Spectrometry," presented at IUPAC International Congress on Analytical Sciences, Waseda University, Tokyo, Japan, August 7, 2001.

- de Haseth, J. A., "Errors and Anomalies in FTS," presented at the First International Conference on Advanced Vibrational Spectroscopy pre-conference symposium, Turku, Finland, August 21, 2001.
- de Haseth, J. A., "Specular and Internal Reflection Spectrometry," presented at the First International Conference on Advanced Vibrational Spectroscopy pre-conference symposium, Turku, Finland, August 21, 2001.
- de Haseth, J. A., "Univariate and Multivariate Quantitative Analysis," presented at the First International Conference on Advanced Vibrational Spectroscopy pre-conference symposium, Turku, Finland, August 21, 2001.
- de Haseth, J. A., R. A. Todebush, and J. L. Jarman, "Capillary Electrophoresis/Fourier Transform Infrared Spectrometry," presented at the Seventh International Symposium on Hyphenated Techniques in Chromatography, Brugges, Belgium, February 6-8, 2002.
- de Haseth, J. A. and J. L. Jarman, "Capillary Electrophoresis/FT-IR Spectrometry: How Small and How Useful?" to be presented in the Bomem-Michelson Award Symposium at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March 2003.
- Barton II, F. E., D. S. Himmelsbach, J. A. de Haseth, W. R. Windham, and W. H. Smith, "The Use of Interferometers and Imaging Spectrometers for Agricultural Applications," presented at the Australian NIR Group Meeting, Freemantle, W.A., Australia, April 17-20, 2004.
- Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "Moving from the Laboratory to the Field with NIR," International Diffuse Reflectance Conference, Chambersburg, PA, August 8-13, 2004.
- Himmelsbach, D. S., F. E. Barton II, and J. A. de Haseth, "Use of Two-dimensional Vibrational Correlation with Near-, Mid-Infrared and Raman Spectroscopy to Study Agricultural Problems," presented at the 31<sup>st</sup> Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Portland, OR, October 3-7, 2004.
- de Haseth, J. A., F. E. Barton, II, and D. S. Himmelsbach, "End User Specification and Justification of a New Field-Ready NIR Spectrometer Design," presented at the 31<sup>st</sup> Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Portland, OR, October 3-7, 2004.
- Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "Applications for a New Series of NIR Spectrometers," presented at the 31<sup>st</sup> Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Portland, OR, October 3-7, 2004.
- de Haseth, J. A. and Shelly I. Seerley, "Attenuated Total Reflection Direct-Deposition Nanosampler," presented at the 31<sup>st</sup> Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Portland, OR, October 3-7, 2004.
- Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "Applications for a New Series of NIR Spectrometers," presented at the Eastern Analytical Symposium, Sommerset, NJ, November 15-18, 2004.

Barton II, F. E., J. A. de Haseth, and D. S. Himmelsbach, "New Instruments for Measuring the Quality of Agricultural Commodities," presented at the 33<sup>rd</sup> U.S.-Japan Cooperative Program on Natural Resources, Honolulu, HI, December 9-17, 2004.

Himmelsbach, D. S., F. E. Barton, and J. A. de Haseth, "Using Two-Dimensional Vibrational Correlation Spectroscopy to Study Agricultural Programs," presented at the 33<sup>rd</sup> U.S.-Japan Cooperative Program on Natural Resources, Honolulu, HI, December 9-17, 2004.

Barton F. E., II, J. A. de Haseth, and D. S. Himmelsbach, "Progress in Developing a New Series of NIR Spectrometers," presented at the 34<sup>th</sup> U.S.-Japan Cooperative Program on Natural Resources, Sukuono, Japan, October 21-27, 2005.

Barton, Franklin E., II, James A. de Haseth, and Davis S. Himmelsbach, "2D Correlation Spectroscopy to Evaluate a New Series of NIR Spectrometers," presented at the 5th Conference of 2D Correlation Spectrometry, Delavan, WI, August 16-18, 2005.

Barton, Franklin E., II, James A. de Haseth, and Davis S. Himmelsbach, "The Need for New Instrumentation for Agricultural Applications," presented at the 12<sup>th</sup> International Conference on Near Infrared Spectroscopy, Sky City, Auckland, New Zealand, April 10-15, 2005.

Franklin E. Barton, II, David S. Himmelsbach, William R. Windham, and James A. de Haseth, "Hyperspectral Imaging: The Agricultural Perspective," International Society for Optical Engineering, Orlando, FL, March 10-15, 2006.

Franklin E. Barton, II, James A. de Haseth, and David S. Himmelsbach, "Interferometers vs Imaging Spectrometers for NIR Applications," Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Orlando, FL, September 24-29, 2006.

de Haseth, James A., J. Brian Loudermilk, David S. Himmelsbach, and Franklin E. Barton, II, "Improvements in Infrared Spectral Database Searching," presented at the 35<sup>th</sup> U.S.-Japan Cooperative Program on Natural Resources, Sonoma, CA, October 22-27, 2006.

#### **Submitted Presentations**

Isenhour, T. L., H. B. Woodruff, S. R. Lowry, and J. A. de Haseth, "Text-Searching of Chemical Data Bases", presented at the 170th American Chemical Society National Meeting, Chicago, Illinois, August, 1975.

de Haseth, J. A., H. B. Woodruff, and T. L. Isenhour, "Applications of Text-Searching for the Detection of Errors in Chemical Data Bases", presented at the 170th American Chemical Society National Meeting, Chicago, Illinois, August, 1975.

de Haseth, J. A., W. S. Woodward, and T. L. Isenhour, "Direct Computer Encoding of Recorded Spectra", presented at the 27th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland, Ohio, March, 1976.

- de Haseth, J. A., H. B. Woodruff, S. R. Lowry, and T. L. Isenhour, "Text-Searching Applied to Mass Spectroscopy", presented at the 27th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland, Ohio, March, 1976.
- Rasmussen, G. T., J. A. de Haseth, W. S. Woodward, S. R. Lowry, and T. L. Isenhour, "Two Years Experience with an In-House Chemical Abstracts Current Awareness Service", presented at the 27th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland, Ohio, March, 1976.
- de Haseth, J. A., and T. L. Isenhour, "The Direct Reconstruction of Gas Chromatograms from Interferometric GC/IR Data", presented at the Second International Conference on Fourier Transform Infrared Spectroscopy, Columbia, South Carolina, June, 1977.
- de Haseth, J. A., A. A. Garrison, R. A. Crocombe, and G. Mamantov, "Time Resolved Infrared Investigations of Photolysis of Small Molecules", presented at the 31st Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1980.
- de Haseth, J. A., and L. V. Azarraga, "Initial Attempts to Reduce Interferometric Data for Efficient Infrared Searches", presented at the 32nd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1981.
- de Haseth, J. A., "Analysis of Spectral Anomalies in Rapid Scanning Fourier Transform Time-Resolved Infrared Spectrometry (TRS)", presented at the Third International Conference on Fourier Transform Infrared Spectroscopy, Columbia, South Carolina, June, 1981.
- de Haseth, J. A., "Interferometer Stability in Gas Chromatography/Fourier Transform Infrared Spectroscopy", presented at the Third International Conference on Fourier Transform Infrared Spectroscopy, Columbia, South Carolina, June, 1981.
- Azarraga, L. V., R. R. Williams, and J. A. de Haseth, "Initial Results from an Interferogram-Based Search System for GC/FT-IR", presented at the Third International Conference on Fourier Transform Infrared Spectroscopy, Columbia, South Carolina, June, 1981.
- de Haseth, J. A., and D. F. Leclerc, "Fractal Analysis Applied to FT-IR Interferograms", presented at the 33rd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1982.
- Leclerc, D. F., and J. A. de Haseth, "Interferogram Data Processing in FT-IR", presented at the 33rd Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1982.
- de Haseth, J. A., and D. F. Leclerc, "Fractal Analysis Applied to Time Domain Signals", presented at the Ninth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September, 1982.
- Leclerc, D. F., and J. A. de Haseth, "Fractal Analysis and FT-IR", presented at the Ninth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pennsylvania, September, 1982.

- Leclerc, D. F., and J. A. de Haseth, "Fractal Analysis Applied to Time-Domain Data Traces", presented at the 34th Southeastern Regional Meeting of the American Chemical Society, Birmingham, Alabama, November, 1982.
- Richardson, P. T., and J. A. de Haseth, "Improvements in Real-Time Analysis of GC/FT-IR Chromatograms", presented at the 34th Southeastern Regional Meeting of the American Chemical Society, Birmingham, Alabama, November, 1982.
- Weaver, S. P., and J. A. de Haseth, "Preliminary Studies in GC Parameters for GC/FT-IR", presented at the 34th Southeastern Regional Meeting of the American Chemical Society, Birmingham, Alabama, November, 1982.
- Lephardt, J. O., and J. A. de Haseth, "An Alternative Chromatogram Reconstruction Technique for GC/FT-IR", presented at the 34th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1983.
- Leclerc D. F., and J. A. de Haseth, "The Fractal Dimension of Time-Domain Signals: Analysis and Applications to Transform Techniques", presented at the 34th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1983.
- Richardson, P. T., and J. A. de Haseth, "A Novel Algorithm for the Isolation of Eluate Peaks in GC/FT-IR Reconstructed Chromatograms", presented at the 34th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1983.
- Weaver, S. P., and J. A. de Haseth, "Modifications of GC Parameters for Improvements in GC/FT-IR", presented at the 34th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1983.
- Richardson, P. T., and J. A. de Haseth, "An Improved Technique for Processing GC/FT-IR Reconstructed Chromatograms", presented at the 13th Annual Symposium on the Analytical Chemistry of Pollutants, Jekyll Island, Georgia, May, 1983.
- de Haseth, J. A., "The Gram-Schmidt Vector Orthogonalization Algorithm and Its Applications to FT-IR", presented at the 4th International Conference on Fourier Transform Spectroscopy, Durham, U. K., September, 1983.
- de Haseth, J. A., "Spectral Search Techniques in FT-IR Spectroscopy", presented at the 35th Southeastern Regional Meeting of the American Chemical Society, Charlotte, North Carolina, November, 1983.
- Leclerc, D. F., and J. A. de Haseth, "Scaling Fractals in FT-IR", presented at the 35th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlantic City, New Jersey, March, 1984.
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- de Haseth, J. A., "Time Resolved Fourier Transform Infrared Spectrometry – Temperature Jump Experiments", presented at the Southeastern Association of Analytical Chemists Meeting, Athens, Georgia, April, 1985.
- Romañach, R. J., J. A. de Haseth, and Y. Ito, "High Speed Countercurrent Chromatography/Fourier Transform Infrared (HSCCC/FT-IR) Spectrometry – Preliminary Studies", Seventh Atlanta Chromatography Symposium, Atlanta, Georgia, May, 1985.
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Turula, V. E. and J. A. de Haseth, "Estimation of Globular Protein Solution Secondary Structure by Solvent Elimination Particle Beam LC/Fourier Transform Infrared Spectrometry: Correlation with Solution Measurements", presented at the 9th International Conference on Fourier Transform Spectroscopy, Calgary, Alberta, Canada, August 23-27, 1993.

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- Turula, V. E. and J. A. de Haseth, "Dynamic Solution Structure of Globular Proteins by Reversed-phase HPLC Particle Beam LC/FT-IR Spectrometry", presented at the 46th Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 5-10, 1995.
- Bhat, S.A. and J.A. de Haseth, "Correlations of Attenuated Total Reflectance Spectra to Physical Properties of Polyurethane Foams," presented at the 10th International Conference on Fourier Transform Spectroscopy, Budapest, Hungary, August 27 - September 1, 1995.
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- Liang, X. and J.A. de Haseth, "The Study of the Formation and Curing of Flexible Polyurethane Foams by Factor Analysis," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March, 1996.
- Zhao, R. and J.A. de Haseth, "Carbohydrate Analysis Using FT-IR/Microscopy and the Hyphenation of CE/FT-IR Spectrometry," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, Illinois, March, 1996.
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- Turula, V.E., R.T. Bishop, R.D. Ricker, and J.A. de Haseth, "Complete Structural Elucidation of a Globular Protein by Particle Beam LC/FT-IR and Electrospray LC/MS: Sequence and Conformation of b-Lactoglobulin," presented at the 20th International Symposium on High Performance Liquid Phase Separations (HPLC '96), San Francisco, California, June, 1996.
- Bishop, R. T., J. A. de Haseth, T. G. Venkateshwaran, J. T. Stewart, and M. G. Bartlett, "Conformational Effects of Reversed Phase Chromatography of Rnase A with Electrospray LC-MS and Particle Beam LC/FT-IR Spectrometry," presented at the 8th International Symposium on Pharmaceutical and Biomedical Analysis, Orlando, Florida, May 4-7, 1997.
- He, L-T. and J. A. de Haseth, "Capillary CE/FT-IR Spectrometry," presented at the 27th International Symposium on Environmental Analytical Chemistry, Jekyll Island, Georgia, June, 1997.
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Bishop, R. T. and J. A. de Haseth, "Deuterium Labeling for Analysis of Reversed-Phase Interaction," presented at the 11th International Conference on Fourier Transform Spectroscopy, Athens, Georgia, August, 1997.

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Melkowitz, R. B. and J. A. de Haseth, "FT-IR Microspectrometric Analysis of Complex Carbohydrates," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 2000.

Melkowitz, R. B., J. A. de Haseth, and S. B. Levery, "Single-Bounce ATR/FT-IR Microspectrometric Analysis of Complex Carbohydrates," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 2001.

Todebush, R. A. and J. A. de Haseth, "Microconcentric CE/FT-IR Nebulizer," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 2001.

Thomas, A. G. A., M. Corredig, and J. A. de Haseth, "ATR/FT-IR Spectrometric Analysis of Protein Secondary Structural Changes in Emulsions," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March, 2001.

Todebush, R. A. J. L. Jarman, and J. A. de Haseth, "Semi-Automated Sample Deposition System," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 2001.

Jarman, J. L. and J. A. de Haseth, "FT-IR Spectrometric Detection for Capillary Electrophoresis," presented at the Federation of Analytical Chemistry and Spectroscopy Societies, Detroit, Michigan, October, 2001.

Jarman, J. L., R. A. Todebush, and J. A. de Haseth, "FT-IR Spectrometric Detection for Capillary Electrophoretic Analyses," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 2002.

Jarman, J. L., S. I. Seerley, and J. A. de Haseth, "Semi-Automatic Sample Deposition and its Application to ATR/FT-IR Spectrometric Analysis," presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana, March 2002.

Jarman, J. L., S. I. Seerley, and J. A. de Haseth, "Precision and Reproducibility of Semi-Automated Sample Deposition for FT-IR/ATR Analyses," presented at the Federation of Analytical Chemistry and Spectroscopy Societies, Providence, Rhode Island, October 2002.

Jarman, J. L. and J. A. de Haseth, "Continued Optimization and Characterization of a Glass Nebulizer CE/FT-IR Interface for Transmission Analyses," presented at the Federation of Analytical Chemistry and Spectroscopy Societies, Providence, Rhode Island, October, 2002.

Seerley, S. I., J. L. Jarman, and J. A. de Haseth, "Semi-Automatic Sample Deposition for Micro ATR/FT-IR Spectrometry," to be presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March 2003.

Jarman, J. L. and J. A. de Haseth, "FT-IR Spectrometric Detection in Capillary Electrophoretic Separations," to be presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March 2003.

Thomas, A. G. A. and J. A. de Haseth, "ATR Infrared Composition Analysis of Intact Oligosaccharides," to be presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida, March 2003.

Jarman, J. L. and J. A. de Haseth, "Application of FT-IR Spectrometric Detection in Capillary Electrophoretic Separations," presented at the 2004 Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, IL, March 8-11, 2004.

Barton, F. E., II, J. A. de Haseth, and D. S. Himmelsbach, "Interferometers vs Imaging Spectrometers for NIR Applications," presented at Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Lake Buena Vista, FL, September 24-28, 2006.

Loudermilk, J. B., F. E. Barton, II, D. S. Himmelsbach, and J. A. de Haseth, "Novel Search Algorithms for a Mid-IR Spectra Database of Cotton Contaminants," presented at Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Lake Buena Vista, FL, September 24-28, 2006.

## **Professional Service**

### **Continuing Education**

**Co-Director: Society for Applied Spectroscopy Short Course on Fourier Transform Infrared Spectrometry.**

Presented: Philadelphia, PA, September 1982; Philadelphia, PA, September 1983; Pasadena, CA, October 1983; Philadelphia, PA, September 1984; Philadelphia, PA,

September 1985; St. Louis, MO, September 1986; Atlantic City, NJ, March 1987; Irvine, CA, October 1987; New Orleans, LA, February 1988; Boston, MA, October 1988; Atlanta, GA, March 1989; Chicago, IL, September 1989; New York, NY, February 1990; Cleveland, OH, October 1990; Chicago, IL, March 1991; Anaheim, CA, October 1991; New Orleans, LA, March 1992; Philadelphia, PA, September 1992; Atlanta, GA, March 1993; Detroit, MI, October 1993; Chicago, IL, February 1994; St. Louis, MO, October 1994; New Orleans, LA, February 1995; Cincinnati, OH, October, 1995; Chicago, IL, March 1996; Kansas City, MO, September 1996; Nashville, TN, September 1999.

Independent presentations: The Perkin-Elmer Corporation, Ridgefield, CT; Standard Oil of Ohio, Cleveland, OH; Dow Chemical USA, Freeport, TX; PPG Industries, Pittsburgh, PA; Alcoa, Pittsburgh, PA; Colegio de Quimicos de Puerto Rico, San Juan, PR.

**Co-Director: Pittsburgh Conference Shortcourse on Advanced Fourier Transform Infrared Spectrometry.**

Presented: Atlanta, GA, March 1997; New Orleans, LA, March 1998.

**Co-Director: Pittsburgh Conference Shortcourse on Measuring and Enhancing the Performance of FT-IR Spectrometers.**

Presented: Orlando, FL, March 1999; New Orleans, LA, March 2000; New Orleans, LA, March 2001; New Orleans, LA, March 2002; Orlando, FL, March 2003; Chicago, IL, February 2004.

**Co-Director: Pittsburgh Conference Shortcourse on FT-IR Spectrometry of Surface Layers.**

Presented: Orlando, FL, March 1999 ; New Orleans, LA, March 2000; New Orleans, LA, March 2001; New Orleans, LA, March 2002 ; Orlando, FL, March 2003; Chicago, IL, February 2004; Orlando, FL, March 2005; Orlando, FL, March 2006; to be presented Chicago, IL, February, 2007.

**Instructor: 1st Euro-American Intensive Shortcourse on Advanced Infrared and Raman Spectroscopy, Hungarian Academy of Sciences, Veszprém, Hungary, August 1995.**

**Organizer and Co-Director: Society for Applied Spectroscopy Workshop on Fourier Transform Infrared Spectrometry.**

Presented: Athens, GA, July 1985; Athens, GA, July 1986; Athens, GA, June 1987; Athens, GA, July 1988.

**Infrared Spectroscopy Shortcourses and Workshops.**

Presented at Bowdoin College, Brunswick, ME: July 1989; July 1990; July 1991; July 1992; July 1993; July 1994; July 1995; July 1996; July 1997; July 1998; July 1999; July 2001; July 2002; July 2003; July 2004; July 2005; July 2006.  
To be presented: July 2007.

Independent presentations: Aspenäs (Lerum), Sweden, May 1990; Aspenäs (Lerum), Sweden, June 1993; Aspenäs (Lerum), Sweden, May 1996; University of Warwick (Coventry), U.K., May, 1997; Stenungsund, Sweden, May 2002; Glumslöv, Sweden, May 2005.

## **Offices in Professional Societies**

### **Coblentz Society**

Membership Committee (Chairman) 1982 - 1997.

Committee on Spectral Digitization 1985 - 1987.

Board of Managers 1985 – 1989.

Ellis Lippincott Award Selection Committee, sponsored by the Society for Applied Spectroscopy, the Coblentz Society and the Optical Society of America (Member 1983 - 1984, as a Coblentz Society representative).

### **Society for Applied Spectroscopy**

Meggers Award Committee (Chairman-Elect 1985, Chairman 1986).

Membership Education Committee (Member 1987 – 1989, Chairman 1988).

Ellis Lippincott Award Selection Committee, sponsored by the Society for Applied Spectroscopy, the Coblentz Society and the Optical Society of America (Member 1987, Chairman 1988, for the Society for Applied Spectroscopy).

Membership Education Coordinator (Coordinator Elect 1992, Coordinator 1993-1996, member 1997).

Executive Committee, 1993-1994.

President-Elect 2006, President 2007, Past-President 2008.

### **International Conferences**

Secretary, Symposium on the Analytical Chemistry of Pollutants, 1985 - 2001.

11th International Conference on Fourier Transform Spectroscopy (ICOFTS), August 1997, at Athens, GA. General Chairman.

International Conference on Fourier Transform Spectroscopy (ICOFTS), International Steering Committee (Member 1995-2003, Chair 2001-2003).

General Chairman for the 25th International Symposium on Environmental Analytical Chemistry, Jekyll Island, Georgia, June 19 through 21, 1995.

General Chairman for the 27th International Symposium on Environmental Analytical Chemistry, Jekyll Island, Georgia, June 15 through 19, 1997.

General Chairman for the 29th International Symposium on Environmental Analytical Chemistry, Jekyll Island, Georgia, May 23 through 27, 1999.

#### **Service in Professional Societies**

GC-IR Sub-Committee of the Coblenz Society Evaluation Committee 1976 - 1979.

Analytical Program Chairman: 34th Southeastern Regional Meeting of the American Chemical Society, Birmingham, Alabama, November 1982.

Conference Organizer and General Chairman - Southeastern Association of Analytical Chemists (SEAAC) Meeting, Athens, Georgia, April 1985.

Session Organizer and Chairman - Eastern Analytical Symposium, New York, New York, November 1984.

Session Organizer and Chairman - Eastern Analytical Symposium, New York, New York, November 1985.

Session Organizer and Chairman - Eastern Analytical Symposium, New York, New York, October 1988.

Session Organizer and Chairman - 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.

Award Symposium Organizer and Chairman - Ellis R. Lippincott Award Symposium presented at the 16th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Chicago, Illinois, October, 1989.

Session Organizer and Chairman - 17th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Cleveland, Ohio, October, 1990.

Vibrational Spectroscopy Session Organizer - 18th Federation of Analytical Chemistry and Spectroscopy Societies Meeting, Anaheim, California, October 6-11, 1991.

Session Organizer and Chairman, Applications of Infrared Fibers to Mid- and Near-IR Spectroscopy - 21st Federation of Analytical Chemistry and Spectroscopy Societies Meeting, St. Louis, Missouri, October 1994.



DECLARATION UNDER 37 CFR 1.132

I, Dr. Edward M. Smolyarenko, hereby declare as follows:

1. I have been an optical materials scientist for over 40 years. I have a Ph.D. in materials science from the Institute of Solid State Physics and Semiconductors, Minsk Belarus (1962) where I was a Research Scientist and latter a Senior Research Scientist from 1962 to 1989. I was a Senior Research Scientist at Inrad, Inc. from 1990 to 1992. I was Director of Crystal Technology at International Crystal Laboratories ("ICL") from 1992 to 2003 and I have consulted with ICL on a part time basis since 2003. I hold 5 Soviet patents and have written dozens of articles, all of which deal with optical materials and crystal growth. I have extensive experience with optics and optical devices. A list of my patents and of some of my journal articles is attached. In my professional capacity I have been intimately familiar with the means of, and requirements for, processing optics for use in optical devices of all kinds.
2. I have read and studied U.S. Patent application 09/977,664 of Robert D. Herpst and I am therefore familiar with the content of that application (hereinafter the "Herpst Application").
3. I have reviewed and understand all of the claims of the Herpst Application.
4. As to claim 1 of the Herpst Application, I understand that a finished product, a sample holder, is claimed for use with an infrared spectrophotometer that has a throughbore and an infrared light transmitting support substrate located in that throughbore that allows the infrared light too pass through the substrate and no other material is present in that throughbore that would substantially absorb the infrared light and where the substrate is formed by one or more of the steps of cleaving, fly cutting, chipping, milling, sawing or scaling and the finished substrate is not precision optically polished.
5. It is my opinion, that it would be unexpected for one skilled in the art of optics or optical materials to be able to construct a finished product in the form of a sample holder for an infrared spectrophotometer or infrared filtometer in accordance with the steps and recited features of that claim.
6. In my opinion, the same is true of claim 18 that is a method for the manufacture of a sample holder for use in an infrared spectrophotometer or infrared filtometer, and, again, a final product sample holder is achieved in a manner that is unexpected to me and I believe to those skilled in the art of optics or optical materials.

7. Since the same limitation or descriptions that I consider to result in the unexpected result discussed above are also present in later independent claims 30, 39, 45, 46, 47 and 53, it is my opinion that those claims describe an invention that achieves unexpected results.

8. In the field of optics and optical materials, it is well known that optics have been precision polished for virtually every application in they have been used as components of optical products or optical device, including those optical devices used in spectroscopy for sample analysis. Use in a spectroscopic sampling device of an optic formed merely by cleaving, fly cutting, chipping, milling, sawing or scaling without precision optically polished is therefore an unexpected result to those skilled in the art.

I hereby declare that all statements made herein of my own knowledge are true and correct and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application of any patent issued under the above referenced application.

*E Smolyarenko*

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Edward M. Smolyarenko

## PUBLICATIONS

"Phase Diagram of the  $\text{CdP}_2$ - $\text{CdAs}_2$  System", with V.A. Rubtsov, et al., *Phys. Stat. Sol. (a)* 115, K155-K158 (1989).

"Processes of Nucleation and Crystal Growth of Boron Nitride Sphalerite Modification", E. Smolyarenko, V.P. Shipilo and L.M. Gameza, *Soviet Powder Metallurgy and Metal Ceamics* 1, 52-58 (1988).

"Thermodynamic Properties of Solid Solutions  $(\text{Zn}_x\text{Cd}_{1-x})_3\text{P}_2$ " E. Smolyarenko and V. Trukhan, *Inorganic Materials* 22 (9) (1986).

"Coefficient of Thermal Expansion of  $(\text{Zn}_x\text{Cd}_{1-x})_3\text{P}_2$  and  $\text{Zn}_3(\text{P}_x\text{As}_{1-x})_2$  Solid Solutions", E. Smolyarenko, V.A. Rubtsov, et al., *Bulletin of the Academy of Sciences of the BSSR* 6, 111-113 (1986).

"Crystal Structure of  $\text{ZnP}_4$  Compound", E. Smolyarenko, V.M. Trukhan, et al., *Crystal Research and Technology*, 21(6), K93-K94 (1986).

"Phase Diagram of  $\text{ZnP}_2$ - $\text{CdP}_2$  System", E. Smolyarenko, V.M. Trukhan and A.P. Bologa, *Phys. Stat. Sol. (a)* 91, K101-102 (1985).

"Phase Diagram of  $\text{ZnP}_2$ - $\text{ZnAs}_2$  System", E. Smolyarenko, V.M. Trukhan and A.P. Bologa, *Phys. Stat. Sol. (a)* 87, K123-126 (1985).

"On the New Compound In Zn-P System", E. Smolyarenko and V.N. Yakimovich, *Proceedings of the BSSR Academy of Sciences (Doklady Akademii Nauk Bssr)* 27(6), 517-519 (1983).

"Temperature Studies of Optical Properties of Cadmium Diphosphide Crystals", E. Smolyarenko, V.G. Fedotov, et al., *Phys. Stat. Sol. (a)* 76, 121-126 (1983).

"Investigation of Temperature Dependence of Zinc Diphosphide Optical Properties", E. Smolyarenko, V.G. Fedotov, et al., *Journal of Applied Spectroscopy* (translation of: *Zhurnal Prikladnoy Spectroscopii*) 35 (3), 6-9 (1981).

"Thermodynamic Properties of High Pressure Phase of  $\text{CdAs}_2$ ", E. Smolyarenko, V.B. Shipilo and V.N. Yakimovich, *Proceedings of the First International Symposium on the Physics and Chemistry of II-V Compounds*, Mogylany, Poland, September 1980.

"Enthalpy and Entropy of  $\text{ZnSnAs}_2$  Formation", E. Smolyarenko and V.N. Yakimovich, *Inorganic Materials* 16(2), 347-348 (1980).

"Study of Thermal and Elastic Properties of Tetragonal Zinc Phosphide in the Phase Transition Region", E. Smolyarenko, A.U. Sheleg, et al., *Inorganic Materials* 16(2), (1980).

"Thermodynamic Functions of Transitions of Phosphorus from Amorphous to Crystal Phase", E. Smolyarenko and A.M. Antyukhov *Inorganic Materials* 15(5), 698-700 (1979).

"Polymorphic Transition in Zinc and Cadmium Phosphides", E. Smolyarenko, N.N. Sirota and A.M. Antyukhov, *Inorganic Materials* (translation of: *Izvestiya Akademii Nauk SSSR - Neorganicheskiye Materialy*) 13(2), 299-301 (1977).



PATENTS

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Production technique for semiconductor solid solutions  $Zn(P_xAs_{1-x})_2$  - with V.M. Trukhan, 1987

Production technique for single crystals of cadmium diphosphide - with V.M. Trukhan, et al., 1986

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Solid electrolyte - with A.U. Sheleg, et al., 1984

Production technique for single crystals of cadmium diphosphide - with L.K. Orlik et al., 1984

Production technique for solid solutions  $Zn_3P_2$ - $Cd_3P_2$

Production technique for tetragonal modification of single crystals of zinc diphosphide - with V.M. Trukhan et al., 1979

Semiconductor switch - with A.A. Andreev et al., 1978

**BEST AVAILABLE COPY**



DECLARATION UNDER 37 CFR 1.132

I, Dr. Edward M. Smolyarenko, hereby declare as follows:

1. I have been an optical materials scientist for over 40 years. I have a Ph.D. in materials science from the Institute of Solid State Physics and Semiconductors, Minsk Belarus (1962) where I was a Research Scientist and latter a Senior Research Scientist from 1962 to 1989. I was a Senior Research Scientist at Inrad, Inc. from 1990 to 1992. I was Director of Crystal Technology at International Crystal Laboratories ("ICL") from 1992 to 2003 and I have consulted with ICL on a part time basis since 2003. I hold 5 Soviet patents and have written dozens of articles, all of which deal with optical materials and crystal growth. A partial list of my publications and a list of my patents is attached. I have extensive experience with optics and optical devices. In my professional capacity I have been intimately familiar with the means of, and requirements for, processing optics for use in optical devices of all kinds.
2. I have read and studied U.S. Patent application 09/977,664 of Robert D. Herpst, and I am therefore familiar with the content of that application (hereinafter the "Herpst Application").
3. I have reviewed and understand all of the revised claims of the Herpst Application which are attached to this Declaration.
4. As to claim 1 of the Herpst Application, I understand that a finished product, a sample holder, is claimed for use with an infrared spectrophotometer that has an aperture formed therein with an infrared light transmitting crystal sample supporting substrate located in that aperture that allows the infrared light too pass through the crystal sample supporting and no other material is present in that aperture that would substantially absorb the infrared light and where the crystal sample supporting substrate is formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling.
5. It is my opinion, that it would be unexpected for one skilled in the art of optics or optical materials to be able to construct a finished product in the form of a sample holder for an infrared spectrophotometer or infrared filtometer in accordance with the steps and recited features of that claim.
6. In my opinion, the same is true of claim 18 that is a method for the manufacture of a sample holder for use in an infrared spectrophotometer or infrared filtometer, and, again, a final product sample holder is achieved in a manner that is unexpected to me and I believe to those skilled in the art of optics or optical materials.

7. Since the same limitation or descriptions that I consider to result in the unexpected result discussed above are also present in later independent claims 30, 39, 45, 46, 47 and 53, it is my opinion that those claims describe an invention that achieves unexpected results.

8. In the field of optics and optical materials, it is well known that optics have been precision processed for virtually every application in which they have been used as components of an optical product or optical device, including those optical devices used in spectroscopy for sample analysis. In its crudest form, precision processing comprises grinding an optical material to make the surfaces flat and parallel to form what is known in the industry as a "blank". An optical blank is opaque and cannot be used in an optical device until the opaque surfaces are made transmissive to energy or light by polishing means. The grinding operation to form a blank is normally done on precision optical equipment such as a planetary lapping machine. Precision polishing of an optic comprises grinding the light transmitting surfaces of an optical material with successively smaller particles of grinding or polishing compounds such as Garnet or Aluminum Oxide until the optic becomes sufficiently transmissive to light or energy for the application for which it is intended. Use in a spectroscopic sampling device of an optic formed merely by cleaving, fly cutting, chipping, milling, or scaling is therefore an unexpected result to those skilled in the art because cleaving, fly cutting, chipping, milling or scaling creates an optic which has not been processed as a blank and has not been precision optically polished yet the optic transmits sufficient light or energy for spectroscopic applications.

9. It is well known in the field of crystal growth and optics that a crystal is a solid and that a crystal is not porous.

I hereby declare that all statements made herein of my own knowledge are true and correct and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application of any patent issued under the above referenced application.

*E Smolyarenko 02/23/07*

Edward M. Smolyarenko

1. A sample holder for use with an infrared spectrophotometer or infrared filterometer that analyzes a sample through which infrared light is transmitted comprising a mounting means comprised of a first material having an aperture formed therein, an infrared light transmitting crystal sample supporting substrate being present in the aperture comprised of a second material allowing infrared light to pass therethrough without the infrared light transmitting crystal sample supporting substrate or any other material within the aperture substantially absorbing infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting sample supporting substrate being formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling.

2. The sample holder as defined in claim 1 wherein the infrared light transmitting crystal sample supporting substrate is mounted in the holder such that the perimeter of the aperture frames all or a centrally located part of said infrared light transmitting crystal sample supporting substrate to form an unimpeded path for infrared light to pass through the infrared light transmitting sample supporting substrate.

Claims 3-9. (canceled)

10. The sample holder as defined in claim 1 wherein said infrared light transmitting crystal sample supporting substrate is an alkali halide crystal.

11. The sample holder as defined in claim 1 wherein said infrared light transmitting crystal sample supporting substrate is an alkali halide crystal selected from the group consisting of KBr, NaCl and KCl.

12-14. (canceled)

15. The sample holder as defined in claim 2 further having an infrared light transmitting cover slide window formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling.

16. The sample holder as defined in claim 15 wherein a spacer is located between said infrared light transmitting crystal sample supporting substrate and said infrared light transmitting cover slide window to create a predetermined space therebetween.

17. The sample holder as defined in claim 15 wherein said infrared light transmitting cover slide window is affixed to said infrared light transmitting crystal sample supporting substrate by a clamping means.

18. A method for the manufacture of a sample holder for use in an infrared spectrophotometer or infrared filterometer, said method comprising the steps of:

providing a mounting means comprised of a first material having an aperture therethrough;

providing an infrared light transmitting crystal material,

forming an infrared light transmitting crystal sample supporting substrate of a second material having infrared light transmissive properties such that the substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling, or scaling material from said infrared light transmitting crystal material to form an infrared light transmitting crystal sample supporting substrate that allows the passage of infrared light therethrough;

positioning the infrared light transmitting crystal sample supporting substrate within the aperture so as to allow infrared light to pass through the aperture and the infrared light transmitting crystal sample supporting substrate and with no other material within the aperture that absorbs infrared light.

19. A method for the manufacture of a sample holder as defined in claim 18 wherein said step of providing a mounting means having an aperture comprises providing a disposable card or demountable card.

20. A method for the manufacture of a sample holder as defined in claim 18 further including the step of:

mounting the infrared light transmitting crystal sample supporting substrate to the holder in a position wherein all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of said aperture.

Claims 21-27. (canceled)

28. A method for the manufacture of a sample holder as defined in claim 18 further including the step of affixing an infrared light transmitting cover slide window to the infrared light transmitting crystal sample supporting substrate to provide a means of sandwiching a sample between said infrared light transmitting cover slide window and said infrared light transmitting crystal sample supporting substrate.

29. (canceled)

30. A method for using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of a first material having infrared light transmissive properties such that the infrared light transmitting crystal substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling, or scaling the infrared light transmitting crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a second material having at least one aperture adapted to fit within the spectrophotometer or filterometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting crystal

sample supporting substrate in the path of the infrared light emitted by an infrared spectrophotometer or filterometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position where all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a sample to be analyzed onto the infrared light transmitting crystal sample supporting substrate,

inserting the holder into the spectrophotometer or filterometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light through the sample, the infrared light transmitting crystal sample supporting substrate and the aperture and no other material within said aperture other than the sample that absorbs infrared light.

31. A method as defined in claim 30 wherein said step of providing a mounting means comprises providing a card made of a disposable material.

32. A method as defined in claim 31 wherein said step of providing an infrared light transmitting material comprises providing an alkali halide crystal material.

33. A method as defined in claim 32 wherein said step of providing an infrared light transmitting material comprises providing a material selected from the group consisting of KBr, NaCl and KCl

34. (canceled)

35. A method as defined in claim 31 wherein said step of providing a mounting means further comprises the step of affixing an infrared light transmitting cover slide window to the infrared light transmitting crystal sample supporting substrate to form a means of sandwiching a sample between said infrared light transmitting cover

slide window and said infrared light transmitting crystal sample supporting substrate, said infrared light transmitting cover slide window being formed by one or more of the steps comprising cleaving, fly cutting, chipping, milling, or scaling without precision optical polishing of the infrared light transmitting cover slide window.

36. A method as defined in claim 35 wherein said step of placing a sample to be analyzed comprises sandwiching the sample between the infrared light transmitting cover slide window and the infrared light transmitting crystal sample supporting.

37. A method as defined in claim 36 wherein said step placing a sample to be analyzed comprises placing a bacterial colony between said infrared light transmitting cover slide window and said infrared light transmitting crystal sample supporting substrate.

38. (canceled)

39. A method for using a sample holder for use in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing a mounting means comprised of a first material having a plurality of apertures adapted to fit within said infrared spectrophotometer or infrared filterometer, said mounting means being formed so as to be capable of orienting the apertures in the path of the infrared light emitted by an infrared spectrophotometer or filterometer,

providing an infrared light transmitting material,

forming a plurality of infrared light transmitting crystal sample supporting substrates comprised of a second material having infrared light transmissive properties such that the substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate being formed by cleaving, fly cutting, chipping, milling or scaling said



infrared light transmitting crystal sample supporting substrates from said light transmitting material,

mounting one of said plurality of said infrared light transmitting crystal sample supporting substrates to the mounting means in a position wherein all or a centrally located part of one of said infrared light transmitting crystal sample supporting substrates is framed by the perimeter of at least one of the apertures,

placing a sample to be analyzed onto at least one of the infrared light transmitting crystal sample supporting substrates,

inserting the holder having the infrared light transmitting crystal sample supporting substrate mounted thereto into said infrared spectrophotometer or infrared filterometer between the infrared light source and the infrared light detector with at least one of the apertures aligned with the infrared light emitted by the infrared light source to allow the passage of a beam of infrared light through one or more samples, said infrared light transmitting crystal sample supporting substrates and apertures and no other material other than the sample within said aperture that absorbs infrared light.

40. A method for using a sample holder as defined in claim 39 wherein said step of forming a plurality of apertures and infrared light transmitting crystal sample supporting substrates mounted thereon comprises forming the plurality of apertures and infrared light transmitting sample supporting substrates in a carousel configuration.

41. A method for using a sample holder as defined in claim 40 wherein said step of placing a sample to be analyzed comprises placing a plurality of samples onto said plurality of infrared light transmitting crystal sample supporting substrates and said infrared spectrophotometer or infrared filterometer passes infrared light sequentially through said plurality of samples, said infrared light transmitting crystal sample supporting substrates and said apertures and no other material within said apertures that absorbs infrared light.

42. A method for using a sample holder as defined in claim 40 wherein said step of placing a sample onto at least one of the infrared light transmitting crystal

sample supporting substrates comprises placing a bacterial colony onto said at least one infrared light transmitting sample supporting substrate.

43. A method for using a sample holder as defined in claim 40 wherein said step of inserting the holder having the infrared light transmitting crystal sample supporting substrate mounted thereto into the infrared spectrophotometer or infrared filterometer comprises inserting the holder in a horizontal position within the infrared spectrophotometer or infrared filterometer and passing a beam of infrared light at least once through the sample, the infrared light transmitting crystal sample supporting substrates and the aperture.

44. A method for using a sample holder as defined in claim 43 wherein the beam of infrared light is passed at least once through the sample by means of reflection.

45. A method for using a sample holder for use in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing a plurality of mounting means comprised of a first material, each having at least one aperture, each of said mounting means being formed so as to be capable of orienting the at least one aperture in the path of the infrared light emitted by an infrared spectrophotometer or filterometer

providing an infrared light transmitting crystal material,

forming a plurality of infrared light transmitting crystal sample supporting substrates comprised of a second material having infrared light transmissive properties such that the infrared light transmitting substrates do not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrates formed by cleaving, fly cutting, chipping, milling, or scaling infrared light transmitting crystal sample supporting substrates from said infrared light transmitting crystal material,

mounting one of said plurality of infrared light transmitting crystal sample supporting substrates to each of said plurality of mounting means in a position wherein all or a centrally located part of said sample supporting mounting means is framed by the perimeter of an apertures,

providing a mechanical carousel adapted to fit into the infrared spectrophotometer or infrared filterometer,

mounting said plurality of mounting means onto the mechanical carousel,

placing a sample to be analyzed onto at least one of the infrared light transmitting crystal sample supporting substrates,

inserting the carousel into the infrared spectrophotometer or infrared filterometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light in a sequential manner through the plurality of infrared light transmitting crystal sample supporting substrates, said samples and said apertures and no other material other than the samples within said apertures that absorb infrared light.

46. A method for using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the infrared light transmitting crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the infrared spectrophotometer or infrared filterometer, said

holder being formed so as to be capable of orienting, the at least one aperture in the path of the infrared light emitted by an infrared spectrophotometer or filterometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position wherein all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

inserting the holder into the infrared spectrophotometer or infrared filterometer to allow the passage of a beam of infrared light through the infrared light transmitting crystal sample supporting substrate to obtain one or more background scans of the absorbance of the infrared light transmitting crystal sample supporting substrate,

placing a sample to be analyzed onto the infrared light transmitting crystal sample supporting substrate,

inserting the holder into the infrared spectrophotometer or infrared filterometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light through the infrared light transmitting crystal sample supporting substrate and the sample located thereon and with no other material within said at least one aperture that absorbs infrared light to obtain a scan of the absorbance of the sample and the infrared light transmitting crystal sample supporting substrate, and,

using the one or more background scans to subtract the background absorbance of the infrared light transmitting crystal sample supporting substrate without the sample from the absorbance of the sample and the infrared light transmitting crystal sample supporting substrate.

47. A method for using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of a second material having infrared light transmissive properties such that the

infrared light transmitting crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the infrared spectrophotometer or infrared filterometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting crystal sample supporting substrate in the path of the infrared light emitted by the infrared spectrophotometer or filterometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position wherein all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a medium onto the infrared light transmitting crystal sample supporting substrate with which a sample will be mixed,

inserting the holder into the infrared spectrophotometer or infrared filterometer to allow the passage of a beam of infrared light through the medium and the infrared light transmitting crystal sample supporting substrate to obtain one or more background scans of the infrared light transmitting crystal sample supporting substrate and the medium,

placing a sample to be analyzed mixed with the medium onto the infrared light transmitting crystal sample supporting substrate,

inserting the holder into the infrared spectrophotometer or infrared filterometer analytical instrument between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow infrared light through the infrared light transmitting crystal sample supporting substrate and the medium mixed with the sample and with no other material other than the sample within said at least one aperture that absorbs infrared light and,

using the one or more background scans to subtract the absorbances of the medium and the infrared light transmitting crystal sample supporting substrate from the absorbances of the medium, the infrared light transmitting crystal sample supporting substrate and the sample.

48. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing an alkali halide crystal powder on the infrared light transmitting crystal sample supporting substrate.

49. A method of using a sample holder as defined in claim 48 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing KBr powder on the infrared light transmitting crystal sample supporting substrate.

50. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing mineral oil on the infrared transmitting crystal sample supporting substrate.

51. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing a solvent on the infrared light transmitting crystal sample supporting substrate.

52. A method of using a sample holder as defined in claim 47 wherein said step of placing a medium onto the infrared light transmitting crystal sample supporting substrate with which the sample will be mixed comprises placing a mixture of KBr powder and a solvent or a mineral oil on the infrared light transmitting crystal sample supporting substrate.

53. A method for using a sample holder in an infrared spectrophotometer or infrared filterometer having an infrared light source and an infrared light detector, said method comprising the steps of:

providing an infrared light transmitting crystal material,

providing an infrared light transmitting crystal sample supporting substrate comprised of second material having infrared light transmissive properties such that the infrared light transmitting crystal sample supporting substrate does not substantially absorb infrared light within a substantial portion of the infrared spectral range, said infrared light transmitting crystal sample supporting substrate formed by cleaving, fly cutting, chipping, milling or scaling the infrared light transmitting crystal sample supporting substrate from said infrared light transmitting crystal material,

providing a mounting means comprised of a first material having at least one aperture adapted to fit within the spectrophotometer or filterometer, said mounting means being formed so as to be capable of orienting the infrared light transmitting crystal sample supporting substrate in the path of the infrared light emitted by an infrared spectrophotometer or filterometer,

mounting the infrared light transmitting crystal sample supporting substrate to the mounting means in a position where all or a centrally located part of the infrared light transmitting crystal sample supporting substrate is framed by the perimeter of the at least one aperture,

placing a bacterial colony to be analyzed onto the infrared light transmitting crystal sample supporting substrate,

inserting the mounting means into the spectrophotometer or filterometer between the infrared light source and the infrared light detector with the at least one aperture aligned with the infrared light emitted by the infrared light source to allow the passage of infrared light through the bacterial colony, the infrared light transmitting crystal sample supporting substrate and the at least one aperture and with no other material other than the bacterial colony within said at least one aperture that absorbs infrared light.

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**PATENTS**

Production technique for semiconductor solid solutions  $\text{Zn}(\text{P}_x\text{As}_{1-x})_2$  - with V.M. Trukhan, 1987

Production technique for single crystals of cadmium diphosphide - with V.M. Trukhan, et al., 1986

Solid electrolyte - with A.U. Sheleg, et al., 1984

Production technique for single crystals of cadmium diphosphide - with L.K. Orlik et al., 1984

Production technique for solid solutions  $\text{Zn}_3\text{P}_2\text{-Cd}_3\text{P}_2$

Production technique for tetragonal modification of single crystals of zinc diphosphide - with V.M. Trukhan et al., 1979

Semiconductor switch - with A.A. Andreev et al., 1978



DECLARATION UNDER 37 CFR 1.132

I, Robert D. Herpst, hereby declare as follows:

1. I am the inventor of the invention described in U.S. Patent application 09/977,664 of Robert D. Herpst and I am therefore familiar with the content of that application (hereinafter the "Herpst Application"). I am also the Managing Director and Chairman of the Board of International Crystal Laboratories ("ICL").

2. ICL has manufactured spectroscopy sampling accessories and optics for spectroscopy since 1962. I have been the Chairman of the Board of ICL since 1982. International Crystal Laboratories has manufactured the invention described in claims 1 and 18 of the Herpst Application since 2002 under a license agreement between ICL and me.

3. Unit sales of the invention described in claims 1 and 15 of the Herpst Application have grown from the 2002 base year, as follows:

2002: 7030 units  
2003: 10540 units  
2004: 13855 units  
2005: 14625 units through October 31, 2005  
2005: 17550 units (annualized to December 31, 2005 based on actual sales through 10 months ended 10/31/05)

4. The growth rates in unit sales of the invention described in claims 1 and -- of the Herpst Application on an annual basis have been as follows:

2002: Base Year  
2003: 49.93%  
2004: 36.95%  
2005: 26.67% (annualized through 12/31/05 based on actual sales through 10 months ended 10/31/05)

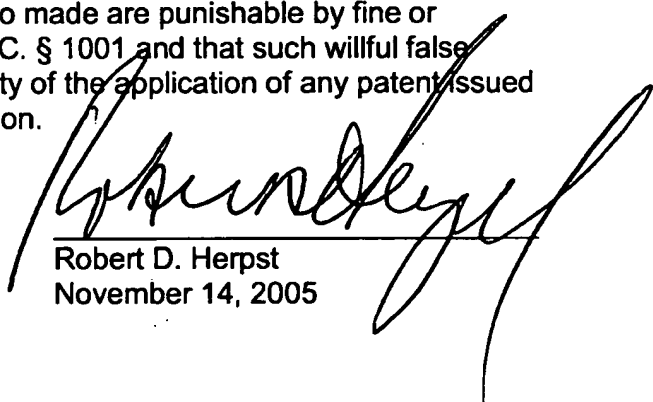
5. The projected average annual compound unit growth rate for the period ended December 31, 2005 (based on actual sales from January 1, 2002 through October 31, 2005) is 36.02% per year.

6. I am familiar with the market for spectrophotometer sampling accessories and devices, which is a business that ICL has been active in for over 43 years and which I have been active in since 1982 as an officer of ICL. The magnitude of the sales of this product and its growth rate are indicative of a commercially successful product in this market (spectrophotometer sampling accessories and

devices). ICL also licenses the product disclosed in the Gagnon patents (US Patents No. 5,470,757 & 5,764,355), which are known generically in the marketplace as "3M cards". In my opinion, the unit sales of the invention disclosed in the Herpst Application equal or exceeds in the unit sales volume the of 3M cards in the comparable first 4 years of production of those products. Furthermore, the dollar volume of sales of the invention disclosed in the Herpst Application now exceeds the dollar volume of licensee sales of "3M cards" as disclosed in the Gagnon patents.

7. In my opinion, based upon conversations with customers who use the invention disclosed in the Herpst Application, the commercial success of the invention disclosed in the Herpst Application is attributable to several of the unique properties of the invention, which include, among other things, that: (i) the product provides a sample support substrate that does not materially absorb infrared energy, (ii) the product provides a sample substrate does not require special storage or handling to protect it from humidity effects, (iii) the product is inexpensive, (iv) the product is disposable and therefore does not require cleaning and (v) the product is self contained and easily mounted in a spectrophotometer.

I hereby declare that all statements made herein of my own knowledge are true and correct and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application of any patent issued under the above referenced application.



Robert D. Herpst  
November 14, 2005